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Public Health Service
Washington, D. C.

30 September 1963

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CALIFORNIA BASIN
GREAT BASIN

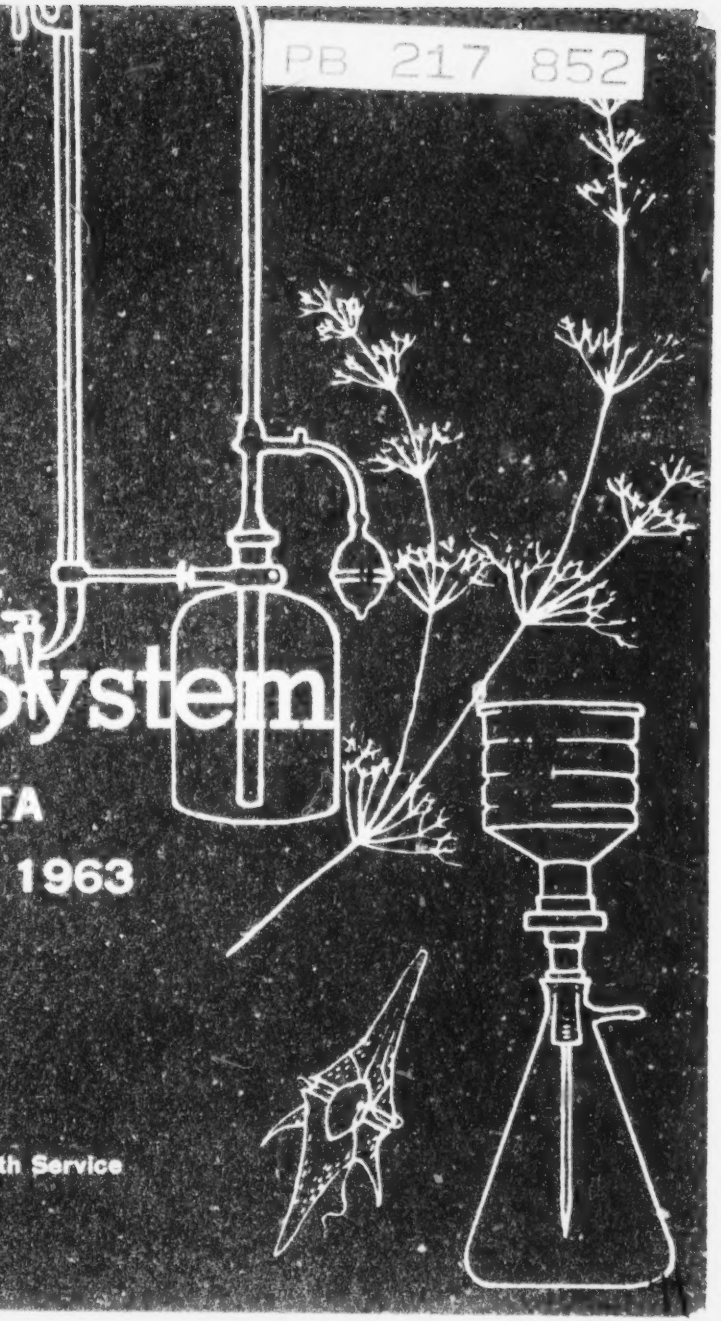
volume 11

PUBLIC HEALTH SERVICE

Water Pollution Surveillance System

ANNUAL COMPILATION OF DATA

October 1, 1962 • September 30, 1963



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • Public Health Service

CALIFORNIA BASIN
GREAT BASIN
Volume 11

Public Health Service
Water Pollution Surveillance System

ANNUAL COMPILATION OF DATA
October 1, 1962 - - - September 30, 1963

A Federal, State and Local cooperative report on water pollution surveillance of surface waters at selected locations throughout the United States

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, Division of Water Supply and Pollution Control
Washington, D.C. 20201

I

RELATED PUBLICATIONS:

National Water Quality Network
Annual Compilation of Data, October 1, 1957–September 30, 1958
Public Health Service Publication No. 663 (1958 Edition)

National Water Quality Network
Statistical Summary of Selected Data, October 1, 1957–September 30, 1958
Public Health Service Publication No. 663—Supplement 1

National Water Quality Network
Annual Compilation of Data, October 1, 1958–September 30, 1959
Public Health Service Publication No. 663 (1959 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1959–September 30, 1960
Public Health Service Publication No. 663 (1960 Edition)

National Water Quality Network
Plankton Population Dynamics, July 1, 1959–June 30, 1961
Public Health Service Publication No. 663—Supplement 2

National Water Quality Network
Annual Compilation of Data, October 1, 1960–September 30, 1961
Public Health Service Publication No. 663 (1961 Edition)

National Water Quality Network
Annual Compilation of Data, October 1, 1961–September 30, 1962
Public Health Service Publication No. 663 (1962 Edition)

ACKNOWLEDGMENT

To increase the usefulness of the water quality data, annual compilations since 1958, including this one, have presented preliminary and unadjusted flow data for gaging stations at or near most of the Public Health Service Water Pollution Surveillance System sampling points. Final data may be obtained directly from the agency concerned. Any studies using the provisional flow data herein compiled should verify the data prior to completion of reports on such studies. For making the flow information available for this publication, grateful acknowledgment is made by the Public Health Service to:

The International Boundary and Water Commission,
United States and Mexico

The International Joint Commission, United States and Canada

The U.S. Department of the Interior
Bureau of Reclamation • Geological Survey

The U.S. Department of the Army
Corps of Engineers • Lake Survey

FOREWORD

This is the sixth annual compilation of data from the Public Health Service Water Pollution Surveillance System (formerly the National Water Quality Network). During this year, the System was increased from 122 to 128 stations. In order to provide data in a form more useful for local or regional water pollution control officials and their staffs, the present compilation is published in 11 separate volumes. The surveillance data reported herein reveal additional findings on pesticides and other organic chemicals in surface waters and on trends in radioactivity and other areas.

The Public Health Service gratefully acknowledges the assistance to our Surveillance System of the participating local, State and Federal Government agencies and private industry. The success of this program depends, in a large measure, upon their continued interest and support.

GORDON E. MCCALLUM, D. Sc.,
Assistant Surgeon General,
Chief, Division of Water Supply and Pollution Control

VOLUME 1

Northeast Basin

CONNECTICUT RIVER
at Enfield Dam, Conn.
below Northfield, Mass.
at Wilder, Vt.

HUDSON RIVER
below Poughkeepsie, N.Y.

LAKE ERIE
at Buffalo, N.Y.

MERRIMACK RIVER
above Lowell, Mass.

RARITAN RIVER
at Perth Amboy, N.J.

ST. LAWRENCE RIVER
at Massena, N.Y.

VOLUME 2

North Atlantic Basin

DELAWARE RIVER
at Philadelphia, Pa.
at Trenton, N.J.
at Martins Creek, Pa.

POTOMAC RIVER
at Washington, D.C.
at Great Falls, Md.
at Williamsport, Md.

SCHUYLKILL RIVER
at Philadelphia, Pa.

SHENANDOAH RIVER
at Berryville, Va.

SUSQUEHANNA RIVER
at Conowingo, Md.
at Sayre, Pa.

VOLUME 3

Southeast Basin

APALACHICOLA RIVER
at Chattahoochee, Fla.

CHATTAHOOCHEE RIVER
at Columbus, Ga.
at Lanett, Ala.
at Atlanta, Ga.

ESCAMBIA RIVER
at Century, Fla.

ROANOKE RIVER
at John H. Kerr Dam and
Reservoir, Va.

SAVANNAH RIVER
at Port Wentworth, Ga.
at North Augusta, S.C.

TOMBIGBEE RIVER
below Columbus, Miss.

VOLUME 4

Western Great Lakes and Lake Erie Basins

WESTERN GREAT LAKES

DETROIT RIVER
at Detroit, Mich.

LAKE MICHIGAN
at Gary, Ind.
at Milwaukee, Wis.

LAKE SUPERIOR
at Duluth, Minn.

ST. CLAIR RIVER
at Port Huron, Mich.

ST. MARYS RIVER
at Sault Ste. Marie, Mich.

LAKE ERIE BASIN

CUYAHOGA RIVER
at Cleveland, Ohio

MAUMEE RIVER
at Toledo, Ohio

VOLUME 5

Ohio and Tennessee River Basins

OHIO RIVER BASIN

ALLEGHENY RIVER
at Pittsburgh, Pa.

CUMBERLAND RIVER
at Clarksville, Tenn.

KANAWHA RIVER
at Winfield Dam, W. Va.

LITTLE MIAMI RIVER
at Cincinnati, Ohio

MONONGAHELA RIVER
at Pittsburgh, Pa.

OHIO RIVER
at Cairo, Ill.
at Evansville, Ind.
at Louisville, Ky.
at Cincinnati, Ohio
at Huntington, W. Va.
below Addison, Ohio
at Toronto, Ohio

WABASH RIVER
at New Harmony, Ind.

TENNESSEE RIVER BASIN

CLINCH RIVER
above Kingston, Tenn.
at Clinton, Tenn.

TENNESSEE RIVER
at Pickwick Landing, Tenn.
at Bridgeport, Ala.
at Chattanooga, Tenn.
at Lenoir City, Tenn.

VOLUME 6

Upper Mississippi River Basin

ILLINOIS RIVER
near Grafton, Ill.
at Peoria, Ill.

MISSISSIPPI RIVER
at Cape Girardeau, Mo.
at East St. Louis, Ill.
at Burlington, Iowa
at Dubuque, Iowa
at Lock and Dam 3 below St. Paul, Minn.

RAINY RIVER
at Baudette, Minn.
at International Falls, Minn.

RED RIVER (NORTH)
at Grand Forks, N. Dak.

VOLUME 7

Missouri River Basin

BIG HORN RIVER
at Hardin, Mont.

BIG SIOUX RIVER
below Sioux Falls, S. Dak.

KANSAS RIVER
at DeSoto, Kans.

MISSOURI RIVER
at St. Louis, Mo.
at Missouri City, Mo.
at Kansas City, Kans.
at St. Joseph, Mo.
at Omaha, Nebr.
at Yankton, S. Dak.
at Bismarck, N. Dak.
at Williston, N. Dak.

NORTH PLATTE RIVER
above Henry, Nebr.

PLATTE RIVER
above Plattsmouth, Nebr.

SOUTH PLATTE RIVER
at Julesburg, Colo.

YELLOWSTONE RIVER
near Sidney, Mont.

VOLUME 8

Southwest-Lower Mississippi River Basin

ARKANSAS RIVER
at Pendleton Ferry, Ark.
at Little Rock, Ark.
near Forth Smith, Ark.
near Ponca City, Okla.
at Coolidge, Kans.

MISSISSIPPI RIVER
at New Orleans, La.
at Delta, La.
at Vicksburg, Miss.
at West Memphis, Ark.

OUACHITA RIVER
at Bastrop, La.

RED RIVER (SOUTH)
at Alexandria, La.
at Bossier City, La.
at Index, Ark.
at Denison, Tex.

VERDIGRIS RIVER
at Nowata, Okla.

VOLUME 9

Colorado River and Western Gulf Basins

COLORADO RIVER BASIN

ANIMAS RIVER
at Cedar Hill, N. Mex.

COLORADO RIVER
at Yuma, Ariz.
above Parker Dam, Ariz.-Calif.
near Boulder City, Nev.
at Page, Ariz.
at Loma, Colo.

GREEN RIVER
at Dutch John, Utah

SAN JUAN RIVER
at Shiprock, New Mex.

WESTERN GULF BASIN

RIO GRANDE
at Brownsville, Tex.
at Laredo, Tex.
at El Paso, Tex.
below Alamosa, Colo.

SABINE RIVER
near Ruliff, Tex.

VOLUME 10

Pacific Northwest and Alaska Basins

PACIFIC NORTHWEST

CLEARWATER RIVER
at Lewiston, Idaho

COLUMBIA RIVER
at Clatskanie, Oreg.
at Bonneville, Oreg.
at McNary Dam, Oreg.
at Pasco, Wash.
at Wenatchee, Wash.
at Northport, Wash.

PEND OREILLE RIVER
at Albeni Falls Dam, Idaho

SNAKE RIVER
at Ice Harbor Dam, Wash.
at Wawawai, Wash.
at Payette, Idaho

SPOKANE RIVER
at Post Falls Dam, Idaho

WILLAMETTE RIVER
at Portland, Oreg.

YAKIMA RIVER
at Richland, Wash.

ALASKA BASIN

CHENA RIVER
at Fairbanks, Alaska

SHIP CREEK
at Anchorage, Alaska

VOLUME 11

California and the Great Basins

CALIFORNIA BASIN

KLAMATH RIVER
near Keno, Oreg.

SACRAMENTO RIVER
at Greens Landing above Courtland, Calif.

SAN JOAQUIN RIVER
near Vernalis, Calif.

GREAT BASIN

BEAR RIVER
above Preston, Idaho

TRUCKEE RIVER
at Calif.-Nev. Border
at Farad, Calif.

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ANALYTICAL AND FLOW DATA INDEX

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GREAT BASIN						
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Truckee River at Calif.-Nev. Border at Farad, Calif	63–64	65	66–67	68	69	70

THE PUBLIC HEALTH SERVICE

Water Pollution Surveillance System

The Public Health Service program for providing fundamental information on the quality of the Nation's waters stems from Public Law 660, approved July 9, 1956, as amended by Public Law 87-88, July 20, 1961. Section 4(c) thereof states: ". . . the Secretary (of Health, Education, and Welfare) shall in cooperation with other Federal, State, and local agencies having related responsibilities, collect and disseminate basic data on chemical, physical, and biological water quality insofar as such data or other information relate to water pollution and the prevention and control thereof."

To fulfill this responsibility, the Public Health Service Water Pollution Surveillance System collects, interprets, and disseminates:

a. Information on changes in water quality at key points in river systems, as such quality may be affected by changes in water use and development.

b. Continuous information on the nature and extent of pollutants affecting water quality.

c. Data which will be useful in the development of comprehensive water resources programs.

d. Data which will assist State, interstate, and other agencies in their water pollution control programs, and in the selection of sites for legitimate water uses.

Some 50 sampling stations were established when the program started, October 1, 1957. By September 30, 1963, the number had grown to 128.

Each sampling location satisfies one or more of the following criteria:

a. Major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

b. Interstate, coastal, and international boundary waters.

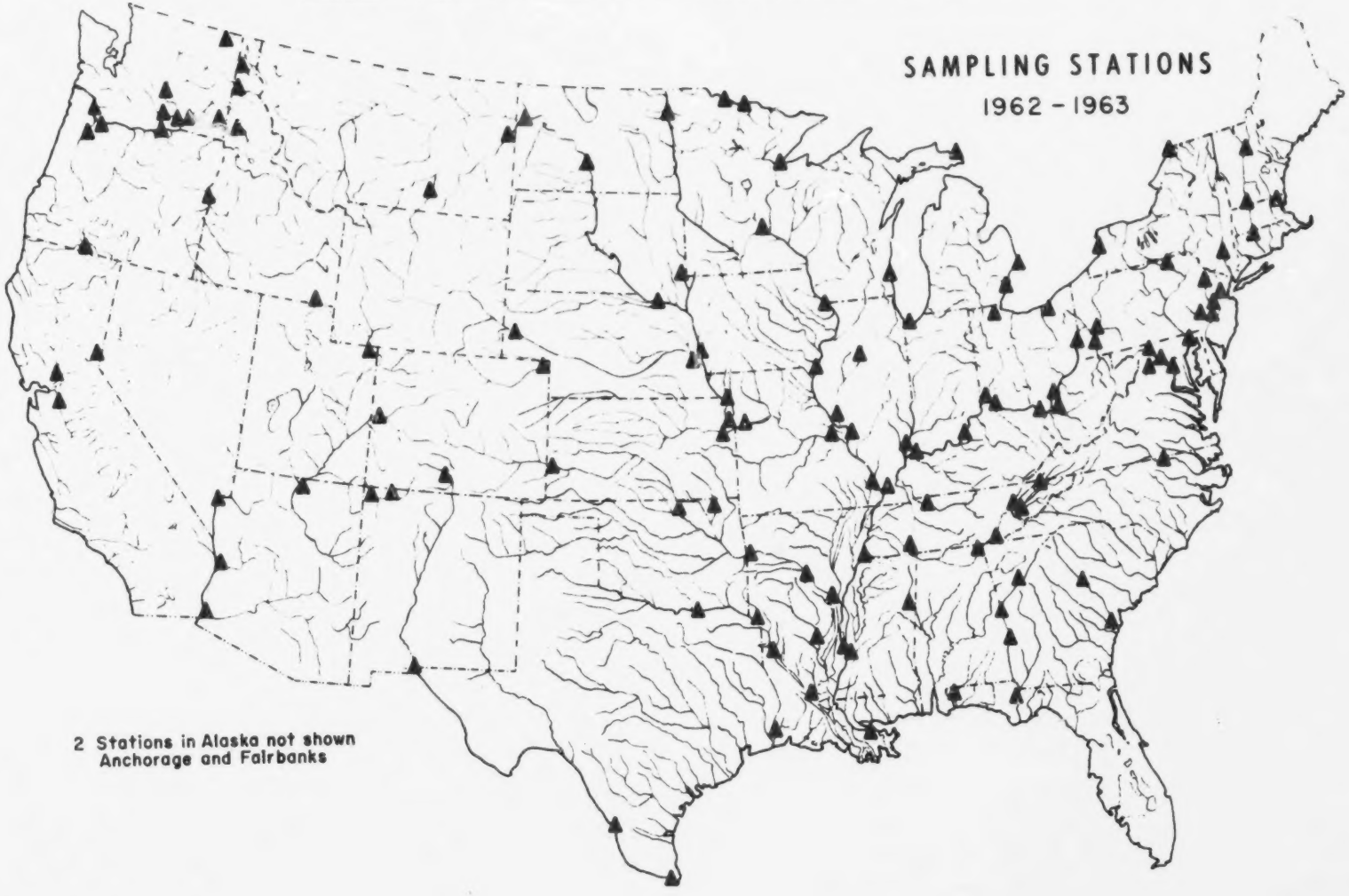
c. Waters on which activities of the Federal Government may have an impact.

Sampling station sites are fixed only after consultation with local, State, Federal and other agencies having related interests.

Active local participation is important in this operation. It assures maximum development of all information valuable both locally and nationally. Program costs are shared by the Federal Government and State and local agencies, those of the latter through contributions of laboratory and sampling manpower. Specifically, the State and local agencies perform certain of the conventional chemical analyses and collect samples for the newer, more complex examinations. The Public Health Service, in turn, performs the more complex determinations and makes the results available to the participants and to the public. In addition, the consultation, training facilities, and other resources of the Public Health Service are available to the cooperating agencies.

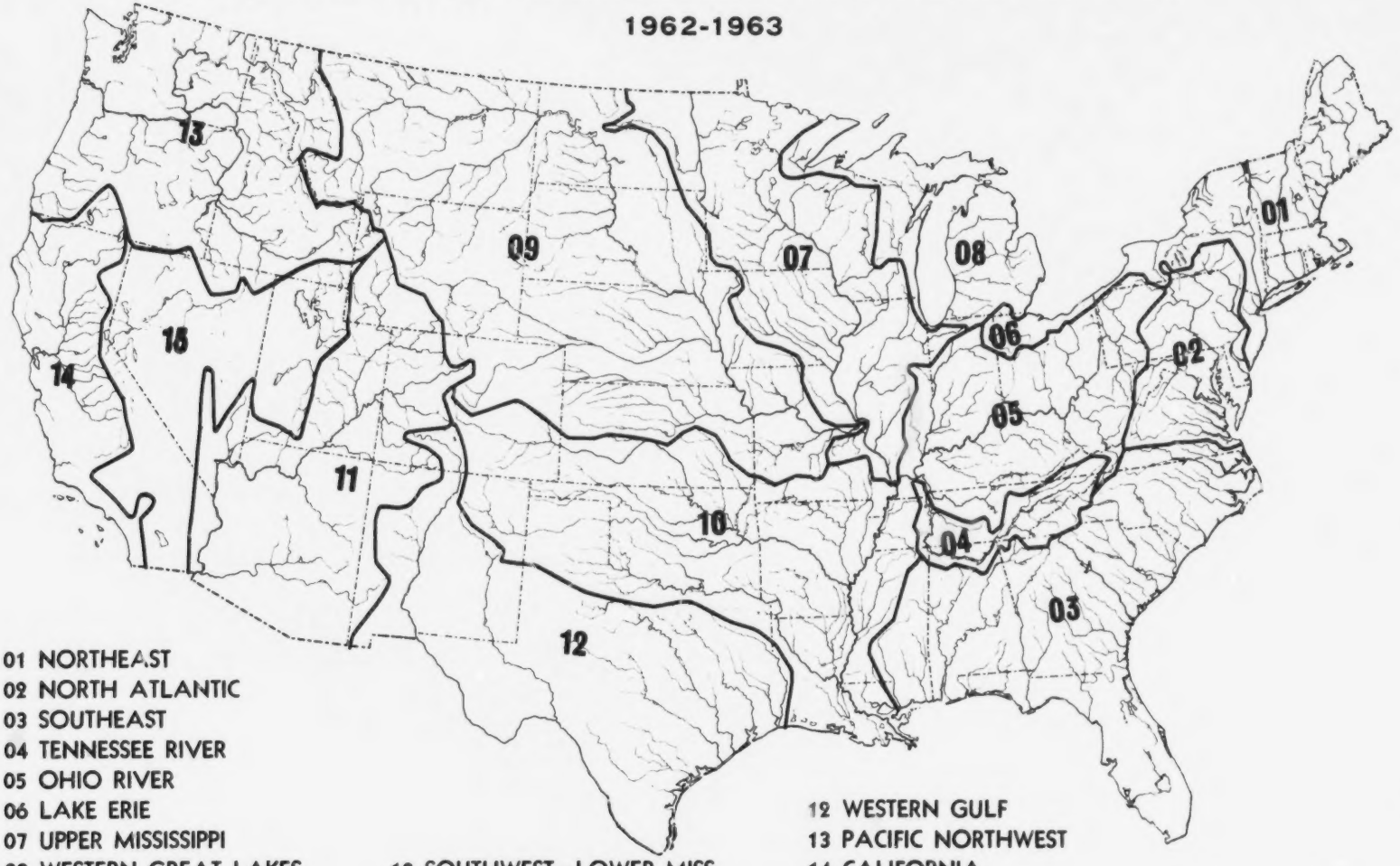
Locations of sampling stations in operation as of September 30, 1963, are shown on page 2. Descriptions of the stations, participating agencies, and other pertinent information are presented with the station data.

PHS Water Pollution Surveillance System



MAJOR RIVER BASINS OF THE UNITED STATES

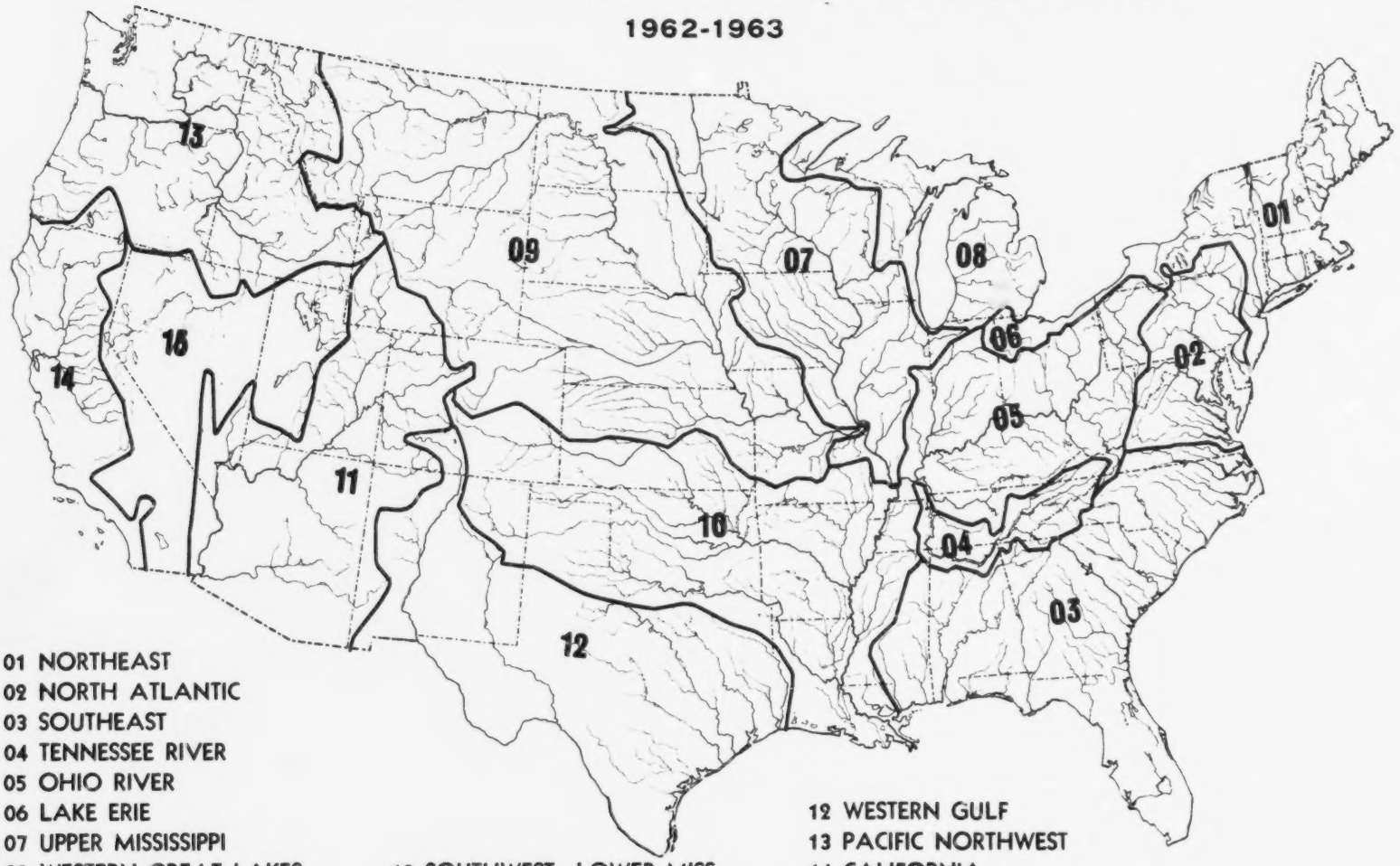
1962-1963



01 NORTHEAST
02 NORTH ATLANTIC
03 SOUTHEAST
04 TENNESSEE RIVER
05 OHIO RIVER
06 LAKE ERIE
07 UPPER MISSISSIPPI
08 WESTERN GREAT LAKES
09 MISSOURI RIVER
10 SOUTHWEST—LOWER MISS.
11 COLORADO RIVER
12 WESTERN GULF
13 PACIFIC NORTHWEST
14 CALIFORNIA
15 GREAT BASIN

MAJOR RIVER BASINS OF THE UNITED STATES

1962-1963



01 NORTHEAST
02 NORTH ATLANTIC
03 SOUTHEAST
04 TENNESSEE RIVER
05 OHIO RIVER
06 LAKE ERIE
07 UPPER MISSISSIPPI
08 WESTERN GREAT LAKES
09 MISSOURI RIVER
10 SOUTHWEST—LOWER MISS.
11 COLORADO RIVER
12 WESTERN GULF
13 PACIFIC NORTHWEST
14 CALIFORNIA
15 GREAT BASIN

Only after careful screening of needs in water resource development was a pattern set for analyses of water samples.
All System samples are examined for:

a. Radioactivity.
   (1) Gross alpha.
   (2) Gross beta.
   (3) Strontium 90.
b. Plankton populations.
c. Coliform organisms.
d. Organic chemicals.
e. Biochemical, chemical, and physical measurements, including biochemical oxygen demand (BOD), dissolved oxygen (DO), chemical oxygen demand (COD), chlorine demand, ammonia nitrogen, hydrogen ion concentration (pH), color turbidity, temperature, alkalinity, hardness, chloride, sulfate, phosphates and total dissolved solids.
f. Sodium, potassium, fluoride and trace elements.

Samples for groups c and e were collected and analyzed weekly. Samples for organic chemicals were collected and analyzed monthly and plankton organism examinations were conducted semimonthly. Water samples for analysis of suspended and dissolved gross alpha and beta radioactivity were submitted weekly. Strontium 90 analyses were made on composites of weekly samples accumulated over 3-month periods. Sodium, potassium, fluoride, and trace metals were also determined on 3-month composites of weekly samples. New parameters which are developed and found significant will be included as the program continues.

Analytical Methods and Reliability of Data

The physical, chemical and biochemical data documented in this publication are the result of efforts of the cooperating agencies. In general, about half of these measurements were contributed by their laboratories. Specifically, all measurements reported for temperature, pH, DO, BOD, COD, chlorine demand and ammonia nitrogen were performed by the participants at the sample collection point. In addition, about 45 of the participating groups regularly perform all or most of the determinations for the remaining parameters included in the data. Whenever possible, analyses for stable constituents not completed by the participants are completed in the central Water Quality laboratories. While individual laboratories make minor modifications to meet local conditions, the methods used in most cases are those published in the 11th edition, "Standard Methods for the Examination of Water and Wastewater" (22). For uniformity, the chlorine demand test is reported on the basis of the starch-iodide titration procedure, and the chemical oxygen demand test is restricted to the use of 0.025 N reagents.

To assure continued reliability in the published data, frequent analysis of reference samples are made by each cooperating laboratory as an integral part of the overall program. Periodically a synthetic standard sample is provided to each participant for reference analysis. The reported results are reviewed. Any significant errors are called to the attention of the reporting laboratory and, after the cause of the errors has been determined, the previously submitted data are either corrected or discarded. From these findings, the analyses reported in this compilation are believed to be accurate to ± 10 percent of the reported values.

The analytical methods used by the Public Health Service laboratories are described in the discussion of water quality parameters which follows, and are covered by references listed in the Bibliography.

Water Pollution Parameters

In the assessment of water pollution, all of the legitimate purposes for which raw waters can be used, and which may be affected by pollution, must be considered. These may range from the minimum requirements for navigation to the ultimate in water quality demanded for certain industrial processing. Standards differ considerably, therefore, according to water use.

For domestic use, water must be free of disease organisms clear, colorless, taste- and odor-free, and have a relatively low dissolved mineral content. Agricultural water is judged primarily on its mineral content, especially with respect to the ratio of sodium to other cations, and the presence of boron. Water for fish propogation and recreational purposes must be relatively free from domestic and industrial pollution and must be able to sustain an active flora of the smaller aquatic organisms on which fish and wildlife feed. Industrial water quality demands run the gamut from the complete absence of minerals to a requirement of low temperature, the critical factor in water used for cooling. The effects of radioactive materials on these uses have not yet been fully appraised.

The various laboratory examinations made as part of this program are discussed below.

Radioactivity

Radioactivity, long recognized as a water contaminant from natural sources, has continued to grow in importance and health significance with the development of nuclear energy for both military and peaceful uses. Consequently, levels must be measured continually as new sources are established.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The total radioactivity in the dissolved solids provides a rough measure of the levels which may be found in a treated water, where water treatment removes substantially all of the suspended matter.

Beta activity levels generally reflect the variable contamination resulting from fallout and discharges from nuclear energy installations, institutions utilizing radioactive materials, and other manmade sources. The trend of gross beta radioactivity in samples received from 47 of the Public Health Service Water Pollution Surveillance System stations operating since 1957 is presented in Figure 1. During the first three quarters of the 1962 water year, renewed weapons testing resulted in a rise in gross beta radioactivity in surface waters of the United States. During the sec-

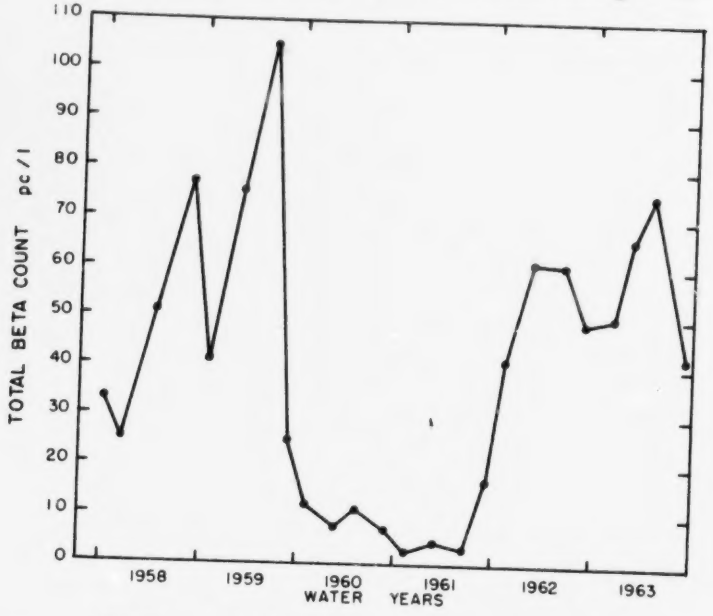


FIGURE 1. GROSS BETA RADIOACTIVITY IN THE SURFACE WATERS OF THE UNITED STATES.

ond and third quarter of water year 1963, the national average activity reached a maximum of 75 pico curies per liter and then decreased. Beta levels have remained well below the Public Health Service Drinking Water Standard of 1,000 pc/l or $\mu\mu$c/l (26).

Alpha levels reflect largely the activity added by uranium and thorium daughters. The waters of the United States can be characterized in a general way with respect to gross alpha radioactivity content. Gross alpha levels average less than 1 pc/l in east coast, Appalachian, Great Lakes, and Pacific Northwest States. On the Colorado Plateau, and along the eastern slope of the Rocky Mountains, natural radioactivity, principally from mineral deposits, results in average concentrations of about 20 pc/l.

Gross levels are most informative in ascertaining long-term trends or changes in water quality. By themselves, however, they are of limited value in assessing radiation exposure. Where gross results are consistently over the maximum permissible concentrations for mixed fission products, the identity of the specific radionuclides involved must be established.

Because of its significance in the environment, the concentration of strontium 90 in the total solids is also reported. In water year 1963, strontium 90 levels ranged from 0.4 to 11.3 pc/l. The national average reached a high of 3.8 pc/l during the fourth quarter (July, August, September 1963). Highest levels were in the north-central area of the coterminous United States where the average was approximately 6 pc/l for this quarter. All averages were less than the limit (10 pc/l) specified in the Public Health Service Drinking Water Standards (26). The levels of strontium 90 activity in waters of the United States since the first quarter of the 1959 calendar year are presented graphically in figure 2.

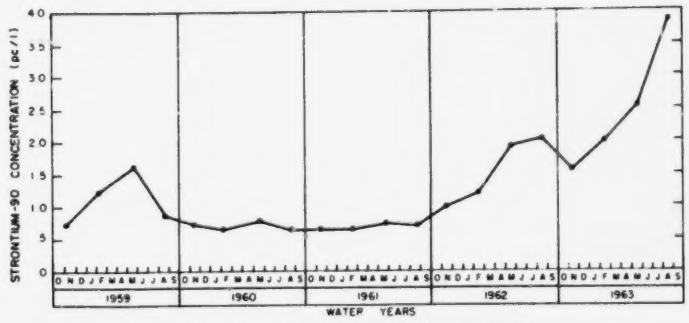


FIGURE 2. STRONTIUM-90 IN SURFACE WATER OF THE UNITED STATES.

Plankton Populations

Geographical distribution of algae and other planktonic organisms are influenced by geologic and climatic factors, and result in distinctive plankton populations in different areas. Within each region, population changes are directly related to temperature, and the nature and concentration of organic and mineral substances which enter the aquatic environment. These substances may come from domestic sewage, industrial wastes, runoff from agricultural lands, irrigation discharges, or native rocks and soils. They may be basic nutrients, highly toxic, or metabolically inert. Planktonic organisms differ greatly in their sensitivity to the nutrient and toxic substances which are present. Some thrive only in water which is relatively free of nutrients while others multiply rapidly in water which has been greatly enriched. Large numbers of tolerant algae usually develop in waters containing abundant supplies of inorganic nitrogen and phosphorus resulting from the mineralization of domestic sewage. These nuisance populations may clog filters in municipal water plants, and produce objectional tastes and odors.

On the other hand, plankton populations may be eradicated by the introduction of toxic organic or mineral wastes. This is not desirable because some plankton organisms play essential roles in providing food and oxygen for higher forms of aquatic life, and in cleansing polluted waters.

Beginning at low nutrient levels, progressive enrichment of waters results in an increase in the variety and abundance of the plankton. However, as higher levels of enrichment are attained, the increase in total numbers of organisms is accompanied by a decrease in the number of kinds of organisms. This change is typical in populations which have been subjected to the wide spectrum of substances being introduced into

surface water in ever increasing amounts. Plankton counts, which provide information concerning the variety and abundance of organisms, are useful in detecting changes in the concentration of organic and mineral substances which enter water supplies.

METHODS OF ANALYSIS

Plankton samples are collected semimonthly at each station. A sample consists of 3 liters of raw water taken directly from the stream or from a treatment plant intake. Preservation is effected at the time of collection by the use of 30 ppm merthiolate.

Three types of analyses are performed:

1. Rotifers, crustacea, and other micro invertebrates are removed from a 1-liter aliquot of the sample by settling 24 hours. The sediment is placed in a special slide, 80 x 50 x 2 mm., and the organisms are enumerated under a compound microscope at 100× magnification. The counts are reported as organisms per liter.

2. A "total live algae" count is obtained from 1 milliliter of the sample by scanning two 50-mm. strips on a Sedgwick-Rafter slide using 200× magnification and a Whipple micrometer disc. An appropriate correction factor is used to convert the counts to units per milliliter. Each single cell or natural aggregate of cells (colony) occupying up to 300 square microns (μ^2) is counted as 1 unit. Large colonies are enumerated according to a modified areal-unit method in which aggregates occupying 300–1,000μ^2 are counted as 2 units, those occupying 1,000–2,500μ^2 as 3 units, those 2500–5000μ^2 as 4 units, and those over 5,000μ^2 as 5 units. About 95 percent of cell aggregates fall into size 1 or 2.

3. Identification and proportional census of diatom species are done from sediment obtained by settling 1 liter of the sample 48 hours. A small aliquot of the sediment is placed on a No. 1 coverglass and dried on a warming table. The sediment is ashed on the coverglass by heating on a hotplate, and permanent slides are made with hyrax mounting medium. Counts are made with 90× apochromatic oil immersion objectives and 10× oculars containing a Whipple micrometer disc. Random strip counts are made until the total number of units reaches 200 to 300. The same areal units are used as described for Sedgwick-Rafter counting.

Organic Chemicals

The Nation's water resources continue to receive increasing quantities of organic contaminants. Since 1940 the chemical industry, particularly in the manufacture of synthetic and petrochemicals, has experienced an enormous expansion that shows every sign of continuing. Each year millions of pounds of synthetic detergents, insecticides, herbicides, and similar domestic products find their way into our streams from household sewers, industrial waste discharges, and land runoff.

Effective and economical treatment methods for most of the complex organic materials remain to be developed. Even where treatment exists, residues may remain in sufficient quantity to cause water damage. These stable residues persist through sewage treatment, biological and chemical action of the stream, and water treatment processes, and finally reach the consumer in drinking water.

The presence of some of these materials, even at concentrations considerably less than 1 part per million, may impair water quality, most noticably in production of tastes and odors. Fishflesh tainting, also quickly noticed by the consumer, is another damage. Effects on water treatment, many of which are ill-defined at present, and impairment of water quality for industrial uses are being reported with increasing frequency. Essentially nothing is known of the possible immediate or long-term effects of these materials on human health. Such information is urgently needed.

The usual sanitary analyses are not effective in measuring these newer organic contaminants. Yet it is essential to know something of their concentrations and character. A method known as the "Carbon Adsorption Technique," developed by the Public Health Service, permits the concentration of these organic compounds from a large volume of water. Elution of the adsorbed materials with organic solvents, followed by chemical separation and testing, provides useful information concerning organic pollution and for assaying river systems for these substances.

Following continuous flow of about 5,000 gallons of water through the carbon adsorption column over a 7- to 10-day period at 0.5 gpm, material on the carbon adsorption column is extracted with two solvents, chloroform and alcohol. The residues are weighed. The concentration of these materials in the water sampled is then computed. See Explanation of Analytical Data, page 21.

CHLOROFORM EXTRACTS

The organic residue recovered from the carbon adsorption column by chloroform is very complex. It is desirable to separate the crude extract into certain broad chemical classes, and this can be done on the basis of solubility differences. The various classes or groups and their general significance are discussed briefly below.

Ether Insolubles

This group is usually a brown, humuslike powder, apparently composed to a large extent of carboxylic acids, ketones, and alcohols of complicated structure. Origin of the group, which is an indicator of "old" pollution, is believed to be partially oxidized sewage and industrial wastes. For example, the Ohio River at Cincinnati has been exposed to much industrial and sewage pollution, and hence large amounts of ether insoluble materials are found. Streams with little or no pollution history have little or no ether insolubles. Chloroform extracts contain from 0 to 30 percent of ether insoluble material.

Water Solubles

These substances are largely acidic and undistillable at moderate temperatures, but their solubility in ether indicates that the molecules are smaller and probably simpler than the ether-solubles. On the other hand, their water solubility practically requires the presence of several functional groups, such as hydroxy-acid, keto-acid, and keto-alcohol. Such compounds probably originate from partial oxidation of hydrocarbons or they may be natural substances. They have very little odor. These materials usually make up 10 to 20 percent of the total extract.

Weak Acids

This group is characterized by being removed from ether solution with sodium hydroxide but not with sodium bicarbonate. Phenols are the best known weak acids, and if present in the water, appear in this group. Other weakly acidic compounds include certain enols, imides, sulfonamides, and some sulfur compounds. This group of materials also occurs in nature. The weak acids are odorous, and commonly constitute 5 to 20 percent of the chloroform extract.

Strong Acids

These acids are usually carboxylic acids such as acetic, benzoic, salicylic or butyric. Although classified as strong in reference to carbonic acid, they are actually weak when compared with a mineral acid, such as sulfuric. Many of the compounds are used industrially, but may also be produced by natural processes, such as fermentation. Some of the materials are highly odorous. This fraction makes up from 5 to 20 percent of the total. The significance of the strong acids can be interpreted only in the light of stream pollution conditions.

Bases

These compounds are organic amines. Such materials as aniline and pyridine are amines of commerce. Lower amines may occur as a result of decomposition. Although odorous, the low concentrations found are not likely to cause objectionable conditions. However, in the case of specific amine-containing wastes the compounds can be of considerable significance. Generally, only 1 or 2 percent of the total extract is made up of the bases.

Neutrals

This group frequently constitutes the major portion of the chloroform extract. Neither basic nor acidic, the materials are less reactive and tend to persist in streams longer than many other types. Hydrocarbons, aldehydes, ketones, esters, and ethers are examples of neutral materials. The group lends itself to further fractionation by means of chromatographic separation into aliphatic, aromatic, and oxygenated subgroups:

Aliphatics: This portion represents petroleum type hydrocarbons in a considerable state of purity, and is usually made up of mineral oil type of material. The percentage of aliphatics present yields important information about the possible source of pollution, since petroleum is the most likely source.

Aromatics: These are principally the coal tar hydrocarbons such as benzene, toluene, and a host of others, and their presence in any significant amount is a reliable indication of industrial pollution. Further, the materials can frequently be identified by infrared spectrophotometry. Some aromatic compounds which have been found in our rivers—and in our drinking water—include DDT, aldrin, endrin, dieldrin, phyenyl ether, orthonitrochlorobenzene, pyridine, phenol, and others. The materials are highly odorous, and may also be toxic. Their appearance in any quantity as pollutants should receive careful evaluation.

Oxygenated compounds (Oxys): These are the neutral compounds containing oxygen, such as aldehydes, ketones, and esters. They may have originated by direct discharge or may represent oxidation products from both natural and industrial materials. They help to indicate the "age" of the pollution, since pollution exposed to oxidation forces for a long time would be expected to contain large amounts of oxys. The oxy materials are odorous.

Losses

Manipulative losses inherent in this type of separation may amount to 10 to 15 percent. Losses greater than this may indicate that volatile components were lost from the sample. Such volatiles may have significance as pollutants.

ALCOHOL EXTRACTS

The alcohol extractables generally consist of materials more polar than the chloroform extractables. They often contain synthetic detergents, carboxylic acids and humic materials which may originate naturally or from oxidized products of domestic and industrial wastes. These classes of substances are not quantitatively recovered by the alcohol extraction. For example, this extraction recovers only 20 to 30 percent of the synthetic detergents present. On waters of mixed industrial and domestic pollution, the chloroform and alcohol extractables may be about equal. On some streams where the industrial pollution is rather low and much natural pollution or sewage is present, the alcohol extractables may exceed the chloroform extractables by a factor of 4 to 6.

The alcohol extract is usually only partially soluble in water and most ordinary solvents. Very little further chemical separation of this material is currently practical. However, tests have revealed that synthetic detergents may make up 1 to 12 percent of the alcohol extract.

OTHER TESTS

Infrared spectra are routinely run on the total chloroform and alcohol extracts as well as the neutral, aliphatic, aromatic and oxygenated groups which are usually the most significant. Spectra of other groups are obtained when there is an indication that they may be significant. These spectra reveal something of the chemical structure of the materials, indicate differences and in certain instances provide a definite identification. In the case of the alcohol extracts, the infrared spectra will indicate the presence of synthetic detergents if the materials constitute a significant portion.

Thin layer chromatography has been applied successfully to the resolution of the aromatic and basic fractions of CCE. Gas chromatographic equipment with flame ionization, electron-capture and microcoulometric detectors have also been used freely in the identification of specific substances.

COMPOSITE ANALYSIS

Samples from certain locations have been selected for analysis on a quarterly composite basis. Stations that have collected at least 12 samples in a nearly consecutive manner and averaged 100 ppb. or less of chloroform extractables are selected for such analysis when certain other conditions are met. However, samples falling in this category are analyzed individually when the recovery of the chloroform extract is exceptionally high and/or it is unusual in its infrared spectrum or some other physical characteristic.

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SPECIFIC IDENTIFICATIONS

Information about specific organic substances which were identified in carbon adsorption samples is given on the second page of the group associated with each station. The increased number of pesticide and other specific compounds identified, as compared to previous years, is partly associated with greater sensitivity in analytical methodology and may be partly a reflection of the increasing usage of these substances in the total environment.

Chemical, Physical, and Bacteriological Examinations

The various biochemical, chemical, physical, and bacteriological examinations generally performed by the participating laboratories are discussed below.

AMMONIA NITROGEN AND CHLORINE DEMAND

The cost of water treatment for domestic use is affected by the consumption of chlorine, with ammonia nitrogen being responsible for a large portion of the chlorine demand. The greater this demand, the more expensive is the treatment. The ammonia may originate from unstabilized domestic pollution, from industrial waste discharges, from run-off containing fertilizers used in farming operations or from all three. The presence of measurable quantities of nitrogen compounds, not necessarily ammonia, is also an indication of the fertility of the stream toward both macro- and micro-biological forms.

COLOR

Color in domestic water supplies is undesirable. Its removal in the water treatment process, whether it be from natural or industrial sources, may require large doses of chemicals and be expensive.

DISSOLVED OXYGEN, BIOCHEMICAL AND CHEMICAL OXYGEN DEMANDS

Biochemical processes, in which aquatic organisms attack and stabilize the organic matter present, require dissolved oxygen. If unstable oxidizable organic matter is present in excess, the organisms will multiply rapidly, consuming the oxygen present in the water, and bring about a foul, septic stream condition. The dissolved oxygen level thus serves to indicate the biochemical activity of the stream. High activity, resulting in low dissolved oxygen levels, will drive out game fish in favor of scavengers. Very low or zero oxygen levels will kill all fish and aquatic organisms dependent on dissolved oxygen for life. Temperature and reaeration rates also affect dissolved oxygen levels.

The 5-day biochemical oxygen demand (BOD) indicates the degree of unstabilized organic pollution from either domestic or industrial sources, to which the stream is being subjected. A significant demand will affect the fish and macroorganism population, and waters carrying a high BOD seldom contain game fish. On the other hand, game fish will thrive in streams in which the oxygen demand has been stabilized, as this condition is usually favorable for the growth of organisms on which fish feed.

The chemical oxygen demand analysis serves to support the findings of the biochemical oxygen demand test. It too may indicate to what extent the waste load of the stream has been stabilized, or it may indicate the presence of organic and inorganic pollution which is not readily oxidized by biological processes. Because the chemical oxygen demand can be determined quickly in comparison to the biochemical oxygen demand, the establishment of a correlation between the two parameters serves to reduce the number of the latter determinations required. The chemical demand results are nearly always higher than the biochemical demand.

TEMPERATURE

Temperature is particularly important to conservation and industry. A few degrees elevation in temperature due to cooling water discharges may seriously limit the capacity of a stream to support fish life. Also, high water temperatures increase the cost of cooling water for

industrial operations. Cooling towers and other equipment for handling cooling water must be engineered to the temperature levels normally encountered.

MINERAL CONSTITUENTS

These determinations include alkalinity, hydrogen-ion concentrations (pH), hardness, chlorides, sulfates, and total dissolved solids. The pH indicates whether water is acidic or alkaline, corrosive or passive. Alkalinity is a measure of the neutralization reserve present, or the extent to which the water can resist a change from an alkaline to an acid condition upon addition of acidic chemicals. This information is important to the water treatment plant operator and to many other water users.

Hardness is not only a measure of the soap consuming property, but is also of importance in the treatment of boiler waters, where removal of hardness is one of the most important functions. Chloride, sulfate, and total dissolved solids add further information on the gross dissolved mineral content carried by the stream. These are of great importance when considering the taste or palatability of water. They are also important when the water is being demineralized for specific industrial processes, since the cost of demineralization is a direct function of the dissolved solids content of the water. In addition, waters of high saline content are less desirable and may at times even be unfit for municipal, irrigation, and other uses.

TURBIDITY

Turbidity of water is due to the suspension of clay, silt, finely divided organic matter, microscopic organisms, and other similar materials. Its presence is of particular importance in water treatment processes and in the propagation of fish and other aquatic life.

COLIFORM ORGANISMS

Information about fecal pollution is essential to water quality measurements. Data on coliform bacteria, used as indicators of pollution, help to point up the trends in the effectiveness of treatment of domestic waste discharges.

The delayed-incubation membrane filter technique is used for the coliform examination, instead of the fermentation tube (MPN) method. The latter necessitates transport of water samples to the Water Quality Section laboratory for examination, with a time lapse between collection and examination that can significantly change their microbial content. Also, some of the many other bacteria present in raw water might overgrow or otherwise inhibit the demonstration of the coliform organisms. In the delayed-incubation membrane filter procedure, the bacteria are filtered out from the fluid samples immediately after collection and the filters sent to the Water Quality Section laboratory on a preservative medium. In the laboratory the membrane filters carrying the bacteria are transferred to a medium selective for coliform organisms, then incubated and counted. The resulting counts approach very closely the actual numbers of coliform bacteria present in the water samples at the time of collection.

Unusual populations of coliform bacteria may mean increased pollution and ensuing loss of water quality. The Public Health Service Water Pollution Surveillance System studies and reports the trends in sewage pollution on streams as indicated by the trends of coliform counts.

Trace Elements and Other Determinations

This year's trace element data differ somewhat from data reported in previous compilations in that the manner of obtaining the data has been modified and the program of elements measured altered. The trace metals measurements are now obtained from a 3.4 meter direct reading spectrograph. Tin, antimony, and bismuth have been discontinued; arsenic, boron, phosphorus, aluminum, and strontium have been added. Increased sensitivity for several elements has been attained, especially zinc, manganese, and beryllium, resulting in fewer indeterminate values.

Twice during the year, 3-month composites of the weekly samples were prepared and subjected to analysis. Examinations covered those elements included in the Public Health Service Drinking Water Standards (*26*), and other metals considered to have possible physiological or

toxicological significance. The ultimate goal of this phase of the program is to provide background data on all elements which may be found in water and which may be of significance in water quality management.

In carrying out the spectrographic examination, the sample is first passed through a membrane filter, .045 micron pore size, to remove all suspended matter. An aliquot of sample is then acidified with redistilled nitric acid and evaporated to a concentration containing 100 mg. of dissolved solids in 5.0 ml. A portion of the prepared sample is placed in a porcelain boat and sparked using a rotating disc, with concentrations of the 19 programed elements measured on the direct reader (*12*).

Waters of low dissolved solids content can be concentrated to a greater degree than those having a high dissolved solids content, thus accounting for the variable sensitivity shown in the tabulations. Values followed by an asterisk (*) show the limits of sensitivity at which the test was performed and indicate that the ion being measured was not detected at that level.

It is known that trace concentrations of some ions are subject to precipitation and adsorption on container surfaces during storage. This applies particularly to iron and manganese which are subject to oxidation. Hence, all the values reported by the spectrographic method represent the quantity of metal in solution at the time of analysis to within about 10 percent.

The measurement of sodium and potassium is performed using a flame procedure. Fluoride is determined with the SPADNS reagent using the method described by Bellack and Schouboe (*3*). Boron, previously measured by the curcumin procedure, is now reported from the spectrograph. Measurement of selenium has been eliminated due to the general absence of this element from the samples examined.

The concentrations of surface active agents, reported as alkyl benzene sulfonate (ABS), in the Nation's surface waters is reported for the first time on a number of selected stations. As the capability of determining this pollutant increases, efforts will be made to include all sampling points in the Surveillance System. The data presented here were obtained using a modification of the Standard Methods methylene blue procedure on an automatic analyzer.

The Benthos

Animals and plants that live in or on the bottom substrata of lakes and streams are known as the benthos. This biological community includes such common animals as immature insects, worms, clams, snails, and crustacea. The benthic populations found on a stream bottom are largely determined by the type of substrate. Bottoms consisting of soft silty sediments are normally inhabited by animals that are able to burrow into the sediments and feed on organic detritus in the sediments. These include worms, clams, and certain insect larvae. The number of species is usually small in these habitats. Shallow streams with shoals, rapids, and riffles have more available niches for animals to occupy and the normal benthic fauna usually includes a large variety of organisms.

The benthic populations provide a basic indicator of general water quality. Whereas the plankton organisms move downstream with the current, and fish are able to migrate considerable distances, the benthos is a population relatively fixed on the bottom and the animals are subject to the water flowing over them. The benthic populations will therefore be influenced by the quality of the water.

The animals that make up the benthos have various life cycles. Insects may exist as aquatic larvae living in the bottom for as long as 2 years. They then emerge as adults and mate. The female deposits fertilized eggs into the stream. Some of the class produce young which attach themselves to fish. Some of the worms reproduce asexually. An analysis of the age structure of certain forms in the benthos may provide information on past conditions of the water.

Under conditions of good water quality the benthos should include a variety of species with no one species being present in excessive numbers. If the water should become degraded, certain species in the population, intolerant of the changed environment, will die out; and as the water quality deteriorates, increased numbers of species in the benthos will be eliminated. The one or more species that survive may be able to develop very large populations. Toxic materials in the water or deposited on the bottom may effectively eliminate all bottom life.

At each station where bottom samples are taken an attempt is made to find areas of suitable substrate. From these areas, where pos-

sible, a series of at least six quantitative samples is taken by means of suitable dredges or samplers. In riffles the Surber squarefoot sampler is used. In deep rivers the Ekman or Peterson dredge is used (see Standard Methods, for the Examination of Water and Wastewater, 11th edition, pp. 572–582) (*22*). A general qualitative collection of invertebrate life is usually made at all stations.

The bottom materials are screened in the field using a screen with 28 meshes to the inch. The concentrated sample is preserved in alcohol and returned to the laboratory.

In the laboratory the sample is transferred to pans and the macroscopic organisms are separated from the sediment and detritus. The animals are then identified as near to species as possible, enumerated, and weighed. Specimens are preserved and retained for future reference.

During this year benthos data were gathered for stations in the Ohio and Tennessee River basins only and are presented with the descriptive material for the appropriate stations. A supplemental analysis of these data will be published separately.

Fish Populations

Fish are a biological end product of the aquatic environment. They are an important source of food, and sport fishing is one of our leading forms of recreation. The maintenance of fish life has been recognized by the Congress, and by States which have protective pollution control legislation, as an important and legitimate use of our Nation's waterways. In other words, in measuring fish populations at Surveillance System stations, we are not measuring a parameter that affects a water use as in the case of other measurements presented in this compilation, but rather a unique parameter that is in itself considered a beneficial water use.

The water quality requirements and tolerance of aquatic life to different types of contaminants vary tremendously. It is this variability in response which makes living aquatic organisms usable indicators of environmental disturbance. Fish require water relatively high in dissolved oxygen, and are intolerant of many chemical and physical contaminants resulting from agricultural, industrial and mining practices. However, the tolerance of different species varies, and man-induced changes of the environment often affect one species more than another, producing imbalanced populations which quite often favor the species less desirable economically.

Moderate amounts of putrescible wastes may enrich the habitat, resulting in great increases in standing crops of fish present. However, under such conditions, the more tolerant and adaptable species may comprise a disproportionate share of the total population, and very sensitive species may be eliminated altogether. The effect of toxic wastes may vary from complete elimination of populations to a reduction in reproductive capacity, growth and resistance to disease and parasitism.

Fish kills are a spectacular and obvious indication that an abrupt change has taken place in the environment. However, because of high mobility resulting in rapid recruitment, the fish population in a river or stream may return to normal levels within a very short time after a kill.

Chronic pollution, to which the fish population must adjust over a period of time, will be reflected in the kinds and relative abundance of the fish species present. In addition to the species composition, the condition of the fish, their growth, reproductive success and certainly their palatability are factors of considerable importance in evaluating the suitability of a body of water for supporting usable stocks of fish.

During the current water year, data on fish populations were gathered for some stations in the Ohio and Tennessee River basins only, and are presented in tables in volume 5 for the appropriate stations.

Fish samples at these stations were collected primarily with rotenone and with an electrofishing device. Five percent emulsified rotenone was applied at suitable sites, where an area of 1 to 3 acres could be blocked off with nets during the rotenoning operation. Such sites were usually in the form of small coves along the shoreline, the mouths of small tributaries, or behind the partial enclosure created by navigational lock walls. An electrical shocking device was used along the shoreline both during the day and at night. In a few cases, samples were also collected with trammel nets and with short, 25-foot haul seines. Sampling with nets and seines was limited because of the paucity of habitat in large rivers which is suitable for using these types of gear.

With each method used sufficient sampling was done to collect as many species present as possible, and to obtain a measure of the relative abundance and size distribution of the various species. Every type of fishing gear is somewhat selective, and the data obtained may not be representative of the actual population composition present in the river at the time of sampling. However, the data obtained by a given method are quantitatively comparable and may be used to evaluate changes in the population composition resulting from natural and man-induced changes in the habitat. Comparisons should be based on samples collected with the same gear, during the same season of the year, and under similar conditions of stream flow and water temperature. These data will be particularly useful in determining the impact of changes in water quality on the fish populations of the Nation's rivers over long periods of time.

For convenience of comparison, the fish in the tables are grouped into six major categories based on food habits and methods of feeding:

I. Large, sight feeding carnivores that feed on other fish. This group includes most game species.

II. Species that feed primarily on insects. This group provides important forage for species in group I.

III. Species that feed primarily on plankton and algae. These also provide important forage for group I species.

IV. Species that feed primarily on mollusks.

V. Omnivores that feed indiscriminately on plant and animal matter from the bottom.

VI. Scavengers that take any available food. Some of the species in this group may sometimes act as predators. The group also includes many important food fish, and species that are tolerant of degraded conditions.

Because foods and feeding habits vary with size, age, and availability of food, there may be considerable overlap between groups. The species listed were grouped according to available literature regarding the main foods of adult specimens of each species.

In the field the total length of the fish was routinely measured to the nearest inch class on a one-half inch interval. Thus a fish in the 5-inch class would measure from 4.5 inches to slightly under 5.5 inches. If the end of the tail touched the dividing line between two length classes, the fish was included in the higher classification. The percent total number and weight are carried to the nearest one-tenth of 1 percent in the tables. The one-tenth of 1 percent was arbitrarily selected for purposes of tabulation, and does not imply such a high level of sampling accuracy.

The fish are listed by common names in the tables according to American Fisheries Society Special Publication No. 2 (1960), A List of the Common and Scientific Names of Fishes From the United States and Canada, Second editi on (*1*).

Stream Flow

Stream flow data have a most important role in the utilization of water quality parameters such as are included in this report. For this reason, average daily flow records are reported for most of the sampling stations in the System.

All flow data included in this compilation are *provisional* data furnished by the agencies credited, and are subject to revision by such agencies prior to any final publication. With the exceptions mentioned, the flows are given as furnished to the Public Health Service.

The data were generally furnished in units of cubic feet per second. In general only the first three digits were considered significant. Because of machine limitations the data are reported here in thousand cubic feet per second. Even though three zeros may appear after the decimal, no artificial accuracy of measurement is implied. Only the first three digits should be considered significant. There are two exceptions:

(1) When the flow was over 1 million cubic feet per second, the first four digits are reported, and (2) at times when the Rio Grande flows were extremely low, the data were reported to tenths of a cubic foot per second. These figures are published showing 4 decimal places.

Flow data for sampling stations on the rivers of the Great Lakes system are reported as the monthly mean flow, as computed by the U.S. Lake Survey. In certain other rivers, flow data were computed by the Public Health Service from information supplied by the gaging agency. The methods of computations are shown as footnotes to the data for the applicable stations.

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Explanation of Analytical Data

RADIOACTIVITY DETERMINATIONS

In evaluating radioactivity data it should be noted that the reported errors represent counting errors only and the reported values are subject to other errors commonly associated with gross radioactivity analysis. (See Reference 22.)

A dash (—) in the count column signifies that no determination was made. An asterisk (*) following date of sample indicates that determinations are for composites of two or more samples taken on and before the date shown.

Strontium 90 determinations are reported in micro-microcuries per liter as measured from total solids in the sample composited for the quarter. A dash (—) indicates that no determination was made in that period.

PLANKTON POPULATION

Plankton data are reported on two pages. The first page lists the population size of various groups of algae. A coded number shows the ten most abundant genera of algae and their count level. Code numbers used are identified on page 18. Blank spaces on the data sheets signify that counts of other genera were below a level of 150 per ml. The second page of plankton data lists the four dominant diatom species and their occurrence as a percent of the total diatom population. The percent of occurrence of all other diatom species is shown in the next column. Identification codes of species are given on page 19.

The detectable numbers per ml. of fungi, sheathed bacteria and protozoa are shown in the next two columns. The rotifer and crustacea totals per liter are listed together with the genera where these occurred at a count level of five or more per liter for rotifers and three or more per liter for crustacea. Nematode and miscellaneous animal form counts per liter appear in the last two columns.

A dash (—) indicates that no analysis was made. A zero count of each group is indicated by "0". Blank spaces under abundance and dominance columns indicate that the populations were too few to be included or were absent. Coding for abundant genera of rotifer and crustacea population levels are presented on page 20.

PLANKTON POPULATION

Identification Codes of Algae Genera and Count Levels of Most Abundant Genera

KEY TO COUNT LEVEL (per ml.)

1 150 to 300
2 301 to 600
3 601 to 1,200
4 1,201 to 2,400
5 2,401 to 4,800
6 4,801 to 9,600
7 9,601 to 19,200
8 19,201 to 38,400
9 38,401 and over

Code to ALGAE GENERA (Producers)

Blue-green Algae

01 Agmenellum (Merismopedia)
02 Anacystis (Microcystis)
03 Anacystis
04 Coccochloris
05 Gomphosphaeria
06, 07, 08 Reserve
09 Other genus
10 Other genus

Filamentous blue-greens

11 Anabaena
12 Aphanizomenon
13 Arthrospira
14 Lyngbya
15 Oscillatoria
16 Phormidium
17 Raphidiopsis
18 Spirulina
19, 20, 21 Reserve
22 Other genus
23 Other genus

Coccoid green algae

24 Actinastrum
25 Ankistrodesmus
26 Chlorella-type
27 Chlorococcum
28 Closterium
29 Coelastrum
30 Crucigenia
31 Dictyosphaerium
32 Golenkinia
33 Lagerheimia
34 Micractinium
35 Oocystis
36 Palmellococcus
37 Pediastrum
38 Scenedesmus
39 Staurastrum
40 Tetradesmus
41 Tetrastrum
42, 43 Reserve
44 Other genus
45 Other genus

Filamentous green algae

46 Cladophora
47 Stichococcus
48 Stigeoclonium
49 Reserve
50 Other genus

Green flagellates

51 Chlamydomonas including Carteria
52 Euglena
53 Lepocinclis
54 Pandorina
55 Phacotus
56 Phacus
57 Trachelomonas
58 Reserve
59 Other genus

Other pigmented flagellates

60 Chromulina
61 Dinobryon
62 Gymnodinium
63 Peridinium
64 Reserve
65 Other genus

Diatoms (with chromatophores)

Centric

66 Biddulphia
67 Coscinodiscus
68 Cyclotella
69 Melosira
70 Rhizosolenia
71 Stephanodiscus
72 Other genus

Pennate

73 Achnanthes
74 Amphiprora
75 Amphora
76 Anomoeoneis
77 Asterionella
78 Caloneis
79 Cocconeis
80 Cymatopleura
81 Cymbella
82 Diatoma
83 Diploneis
84 Fragilaria
85 Gomphonema
86 Gyrosigma
87 Navicula
88 Nitzschia
89 Pleurosigma
90 Rhoicosphenia
91 Surirella
92 Synedra
93 Tabellaria
94, 95, 96 Reserve
97 Other genus
98 Other genus
99 Other genus

PLANKTON POPULATION

Identification Code for Diatom Species

No.	Species
01	Achnanthes lanceolata
02	Achnanthes minutissima
03	Achnanthes sp.
04	Amphiprora paludosa
05	Amphiprora sp.
06	Amphora ovalis
07	Amphora sp.
08	Anomoeoneis exilis
09	Asterionella formosa
10	Bacillaria paradoxa
11	Biddulphia laevis
12	Caloneis amphisbaena
13	Caloneis sp.
14	Ceratoneis arcus
15	Cocconeis pediculus
16	Cocconeis placentula
17	Cocconeis sp.
18	Coscinodiscus rothii
19	Coscinodiscus (brackish)
20	Coscinodiscus sp.
21	Cymatopleura solea
22	Cymatosira belgica
23	Cyclotella atomus
24	Cyclotella comta
25	Cyclotella kutzingiana
26	Cyclotella meneghiniana
27	Cyclotella pseudostelligera
28	Cyclotella stelligera
29	Cyclotella striata
30	Cyclotella sp.
31	Cymbella ventricosa
32	Cymbella tumida
33	Cymbella sp.
34	Denticula sp.
35	Diatoma elongatum
36	Diatoma vulgare
37	Diatoma sp.
38	Diploneis smithii
39	Diploneis sp.
40	Epithemia turgida
41	Epithemia sorex
42	Epithemia sp.
43	Eunotia sp. (first)
44	Eunotia sp. (second)
45	Fragilaria capucina
46	Fragilaria construens
47	Fragilaria crotonensis
48	Fragilaria pinnata
49	Fragilaria sp.
50	Frustulia sp.
51	Gomphonema olivaceum
52	Gomphonema sp.
53	Gyrosigma kutzingii
54	Gyrosigma sp.
55	Hantzchia amphioxys
56	Melosira ambigua
57	Melosira distans var. alpigena
58	Melosira granulata
59	Melosira binderana
60	Melosira islandica
61	Melosira italica
62	Melosira varians
63	Meridion circulare
64	Navicula cryptocephala
65	Navicula sp. (first)
66	Navicula sp. (second)
67	Nitzschia acicularis
68	Nitzschia tryblionella
69	Nitzschia denticula
70	Nitzschia (Lancelolatae group)
71	Nitzschia sp. (first)
72	Nitzschia sp. (second)
73	Opephora martyi
74	Pinnularia sp.
75	Pleurosigma delicatulum
76	Rhoicosphenia curvata
77	Rhizosolenia eriensis
78	Rhopalodia gibba
79	Rhopalodia sp.
80	Stephanodiscus astraea var. minutula
81	Stephanodiscus dubius
82	Stephanodiscus hantzschii
83	Stephanodiscus niagarae
84	Stephanodiscus sp.
85	Surirella brightwelli
86	Surirella ovata
87	Surirella striatula
88	Surirella sp.
89	Synedra acus
90	Synedra pulchella
91	Synedra nana
92	Synedra ulna
93	Synedra vaucheriae
94	Synedra sp.
95	Tabellaria fenestrata
96	Tabellaria flocculosa
97	Any entity not found above (first)
98	Any entity not found above (second)
99	Reserved for future entity
xx	Insignificant or population inadequate

PLANKTON POPULATION

Identification Codes of Microinvertebrate Genera and Count Levels of Most Abundant Genera

Genera of ROTIFERS
Key to counts per liter

1 5 to 10
2 11 to 20
3 21 to 40
4 41 to 80
5 81 to 160
6 161 to 320
7 321 to 640
8 641 to 1,680
9 1,681 and over

Genera of CRUSTACEA
Key to counts per liter

1 3 to 5
2 6 to 10
3 11 to 20
4 21 to 40
5 41 and over

Code to
MICROINVERTEBRATES

Rotifers

01 Asplanchna
02 Brachionus (also Platyias)
03 Collotheca
04 Cephalodella
05 Chromogaster
06 Euchlanis
07 Filinia
08 Gastropus
09 Hexarthra (also Pedalia)
10 Kellicottia
11 Keratella
12 Lepadella
13 Monostyla (also Lecane)
14 Notholca
15 Philodina and similar contracted bdelloids
16 Ploesoma
17 Polyarthra
18 Pompholyx
19 Proales
20 Rotaria
21 Synchaeta
22 Trichocerca
23 to 45 Reserve
46 Other genus
47 Other genus
48 Other genus
49 Other genus

Cladocerans

50 Nauplii
51 Bosmina and related genera
52 Daphnia and related genera
53 Moina
54 Polyphemus
55 to 72 Reserve
73 Other genus
74 Other genus
75 Other genus

Copepods

76 Cyclops,Euclops, and Paracyclops
77 Diaptomus
78 to 97 Reserve
98 Other genus
99 Other genus

Blank—Insignificant or population inadequate

ORGANIC CHEMICALS

Although units of concentration may be assigned to the values reported herein (μg/l or parts per billion), it is essential that the user of these data consider additional associated information. Introspective examination of the data reported herein has indicated that comparison of concentration values obtained from samples of similar gallonage are more valid than samples of widely differing gallonage. In addition, recent experimental researches have shown that lower flow rates and lower sample volumes than those employed (5,000 gallons at 0.5 gpm) are substantially more efficient and should produce relatively higher concentration values with this method. The first in a series of changes designed to increase sampling efficiency is already underway at Water Pollution Surveillance System stations.

Concentration values reported for specific substances are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE. In light of an unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.

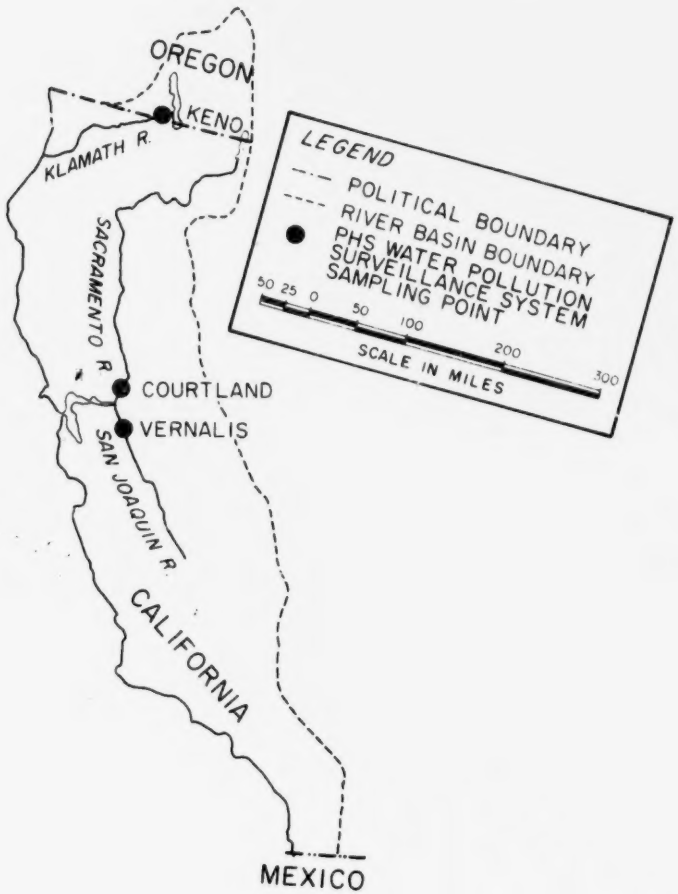
Zeros when reported have been entered. A dash indicates that the respective results were not reported. An asterisk in the column showing end of sample date indicates that the determinations are for composited samples taken on and before the date shown. The extent of compositing can be determined by examining the gallons filtered, which is the sum of the applicable individual samples immediately above it.

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

The data entered in each column are as reported. Concentrations of alkalinity and hardness are reported in milligrams per liter as $CaCO_3$. A dash signifies that the particular test was not performed. Zeroes when meaningful have been entered. An asterisk preceding a number should be read as "less than" the number following it.

TRACE ELEMENTS AND OTHER DETERMINATIONS

For a discussion of the sensitivity limits of the determinations performed with spectrographic methods, see page 11.



CALIFORNIA

The California basin covers some 111,000 square miles, of which about 4,500 are in Oregon. The Great Central Valley of California includes the Sacramento and San Joaquin Valleys, drained by rivers of the same names with drainage areas of about 60,300 and 17,000 square miles, respectively. The Klamath River Basin occupies about 15,700 square miles in northern California and southern Oregon. A Water Pollution Surveillance System station is located in each of these major basins. Flows throughout the Sacramento and San Joaquin Rivers reflect the operation of multipurpose dams and reservoirs. The upper reaches of the Klamath are also regulated.

Annual precipitation varies from over 100 inches in the north-coastal mountains to from 10 to 15 inches in the central and south-coastal areas. Average minimum and maximum temperatures along the coast are 55° and 68° F. at San Diego and 46° and 57° F. at Eureka. At the 5,000-foot elevation inland, corresponding temperatures are 34° and 56° F. at La Porte, Plumas County.

The major industries include irrigated agriculture, food processing, petroleum production and refining, lumber, paper and allied products, electric power generation, aircraft and missile manufacturing, and recreation.

Maximum phytoplankton counts in this region range from about 2,000/milliliter in the Sacramento River to 40,000/milliliter in the San Joaquin River. The higher phytoplankton counts are generally associated with greater concentrations of hardness and dissolved phosphate. Rotifer populations reached maxima of several hundred per liter during periods of high phytoplankton counts.

The phytoplankton of the Central Valley during water year 1963 were dominated by diatoms. The more numerous pennate diatoms are *Synedra ulna, Navicula* spp., *Fragilaria construens* and *Asterionella formosa.* The most abundant centric diatoms include *Melosira ambigua, Melosira granulata, Cyclotella meneghiniana, Stephanodiscus astraea* var. *minutula, S. hantzschii,* and *S. niagarae.*

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KLAMATH RIVER NEAR KENO, OREGON

The river near Keno drains a semi-arid interior plateau which includes some 200,000 irrigated acres. Samples are taken from the river below the John C. Boyle power plant. This station is located below Klamath Lake near the California State line. In this river system, the Upper Klamath Lake is characterized by heavy nuisance blooms of blue-green algae, Aphanizomenon sp., which are due to natural enrichment of the waters.

During water year 1963, phytoplankton in the Klamath River near Keno changed in both character and population density as compared with the preceding year. Blue-green algae decreased in numbers by two orders of magnitude while diatom populations decreased by only one order and therefore became dominant.

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Station Location: Klamath River near Keno, Oregon

Major Basin: California

Minor Basin: Klamath River

Station at: 42°06' Latitude 121°57' Longitude

Miles above mouth: 220

Activation Date: November 7, 1960

Sampled by: California-Oregon Power Company
Klamath County Health Department

Field Analysis by: City of Klamath Falls Sewage Treatment Plant

Other Cooperating Agencies: Oregon State Board of Health

Hydrologic Data:

Nearest pertinent gaging station: below John C. Boyle power plant near Keno, Oregon

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 4,080 square miles

Period of record: 1959 to present

Average discharge in record period: 1,493 cfs. WY 1962 only

Maximum discharge in record period: 3,320 cfs.

Minimum discharge in record period: 458 cfs.

Remarks: Flow regulated by Upper Klamath Lake irrigation diversion above gaging station. Fluctuations in flow due to power plant operation.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.20	.20
	Na	26	15
	K	4.2	2.9
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	8	47
	Cd	*1	*2
	As	*11	*21
	B	56	79
	P	143	*11
	Fe	24	7
	Mo	*10	36
	Mn	*.5	*1
	Al	—	*11
	Be	*.03	*.05
	Cu	3	38
	Ag	*.2	*.5
	Ni	*1	2
	Co	*2	*2
	Pb	*3	*5
	Cr	*1	*5
	V	*1	40
	Ba	10	7
	Sr	80	122

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.2	April to June	1.4	.2
January to March	—	—	July to September	—	—

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE OREGON

MAJOR BASIN CALIFORNIA

MINOR BASIN KLAMATH RIVER

STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

78

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON				
			DATE OF DETERMINATION	ALPHA					BETA						DATE OF DETERMINATION	GROSS ACTIVITY			
				SUSPENDED		DISSOLVED		TOTAL	SUSPENDED		DISSOLVED		TOTAL			ALPHA		BETA	
MO	DAY	YR	MO. DAY	pc/l	±	pc/l	±	pc/l ±	pc/l	±	pc/l	±	pc/l	±	MO. DAY	pc/g	±	pc/g	±
10	2	62	12 19	-	-	-	-	- -	2	5	9	7	11	9					
10	11	62	11 23	0	0	0	0	0 0	1	5	15	7	16	9					
10	24	62	11 17	0	0	0	0	0 0	0	7	14	7	14	10					
10	30	62	11 26	-	-	-	-	- -	3	5	18	7	21	9					
11	27	62	12 26*	0	0	0	1	0 1	8	5	18	6	26	8					
12	31	62	1 24*	0	0	0	0	0 0	11	7	17	8	28	11					
1	29	63	2 19*	1	1	1	1	2 1	5	6	18	8	23	10					
2	26	63	3 18*	0	1	0	1	0 1	46	4	35	4	81	6					
3	25	63	4 16*	1	1	1	1	2 1	28	7	30	8	58	11					
4	29	63	5 24*	0	0	0	1	0 1	27	6	28	7	55	9					
5	28	63	6 24*	0	0	0	1	0 1	13	3	31	4	44	5					
6	24	63	7 24*	0	0	0	1	0 1	0	5	17	6	17	8					
7	15	63	9 9*	0	1	0	0	0 1	3	3	13	3	16	4					
8	26	63	10 1*	0	0	0	0	0 0	4	3	15	4	19	5					
9	30	63	10 31*	0	0	1	1	1 1	7	6	17	7	24	9					

PLANKTON POPULATION

STATE OREGON
MAJOR BASIN CALIFORNIA
MINOR BASIN KLAMATH RIVER
STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

DATE OF SAMPLE			ALGAE (Number per milliliter)								INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
				BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS				1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR	TOTAL	COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	2	62	2100	270	0	120	0	100	40	700	830	210	290	71	[illegible]	79	1	2	1														
10	17	62	6500	40	0	80	0	0	40	1260	5090	750	2030	71	3	92	3	85	3	81	3	87	3	69	1	84	1						
11	5	62	700	20	0	90	0	20	0	160	410	1090	1130																				
11	20	62	400	60	0	20	20	0	0	230	80	290	590	71	1																		
12	4	62	1500	0	0	130	0	0	0	840	550	0	0	71	3	84	1																
12	17	62	2700	180	0	130	0	20	0	1920	450	3600	2410	71	3	69	3	3	1	77	1												
1	7	63	1700	0	20	70	0	110	0	330	1210	1170	1560	77	2	84	2	71	1														
1	21	63	3300	0	0	530	0	40	0	370	2400	590	970	77	8	71	2	44	1	45	1												
2	4	63	7300	40	130	130	0	420	40	1050	5500	4580	4330	77	5	84	3	71	3	51	2	69	1										
2	19	63	6700	0	70	20	0	200	350	1030	5040	1030	5110	77	5	71	3	92	1	64	1	88	1	65	1	51	1						
3	4	63	7900	0	0	0	0	0	450	1040	6390	2160	14720	77	6	71	3	65	2	92	1	84	1										
3	19	63	8100	0	0	80	0	130	80	710	7100	1680	11420	77	6	71	3	92	2	88	1												
4	1	63	14800	0	210	520	0	570	790	3050	9650	3570	12920	77	6	71	5	64	3	87	3	92	2	51	2	17	1	84	1	55	1		
4	17	63	12600	0	40	460	40	40	210	1300	10540	2690	9740	77	7	71	4	38	1	65	1												
5	6	63	9900	20	110	260	0	200	0	1500	7850	1140	5590	77	6	71	4																
5	21	63	2600	150	80	400	0	60	20	250	1620	210	270	77	3	82	1																
6	3	63	700	0	0	20	0	40	0	260	370	110	790	77	1	71	1																
6	17	63	1100	0	0	90	0	50	0	540	450	90	360	69	2	82	1	88	1														
8	5	63	900	0	20	210	0	120	100	230	150	80	250																				
8	19	63	2500	110	310	590	0	240	0	730	550	150	130	11	2	44	1	51	1	77	1												
9	2	63	1100	90	340	200	0	90	0	290	70	420	650	11	2																		
9	16	63	900	340	0	20	0	0	0	200	70	0	200	3	2																		

PLANKTON POPULATION

STATE OREGON

MAJOR BASIN CALIFORNIA

MINOR BASIN KLAMATH RIVER

STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

078

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml)	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH				PROTOZOA (Tdens/mlvols) Number per ml	ROTIFERS										CRUSTACEA								NEMATODES (Tdens/mlvols) Number per liter	OTHER ANIMAL FORMS (Number per liter)
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)										NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)									
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD					
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL				
10	2	62	46	16	83	14	82	8	16	7	55	-	-	3																	0	0		
10	17	62	83	23	45	10	56	7	32	5	55	-	-	2											0						0	0		
11	5	62	83	51	46	10	45	6	56	6	27	-	-	79	2	4	11	1							0						0	0		
11	20	62	83	39	82	15	46	9	9	4	33	50	10	9	11	1									15	76	3	50	1		0	0		
12	4	62	83	83	46	4	36	2	16	1	10	130	0	3											5	50	1				0	0		
12	17	62	83	80	56	4	45	2	82	1	13	-	-	114	2	4	11	3	17	2					1						0	0		
1	7	63	83	16	9	16	82	14	46	13	41	-	-	104	11	4	2	3	17	1					33	50	3	52	2	77	2	1	0	
1	21	63	9	68	82	15	46	4	83	2	11	-	-	3											33	50	3	76	3	52	1	0	0	
2	4	63	9	82	82	6	46	4	56	1	7	80	0	12	17	1									1						0	0		
2	19	63	9	60	82	10	56	6	83	4	20	-	-	75	11	3	2	3							2						0	0		
3	4	63	46	30	9	22	83	17	56	5	26	-	-	167	2	5	11	4	7	2					12	50	3				0	0		
3	19	63	83	33	56	11	9	8	92	6	42	-	-	348	2	6	11	5	7	3					47	50	5	52	1		0	0		
4	1	63	9	73	82	7	83	6	46	5	9	-	-	99	11	4	2	2	14	1	7	1			30	50	4	76	2		0	0		
4	17	63	9	37	83	33	56	4	46	3	23	-	-	260	11	6	7	4	2	3					30	50	4	51	1		0	0		
5	6	63	9	50	83	31	46	5	48	4	10	-	-	-											96	50	5	77	3	76	1	1	1	
5	21	63	9	47	83	21	46	6	36	3	23	-	-	-											-						-	-		
6	3	63	9	26	83	19	82	11	36	5	39	-	-	-											-						-	-		
6	17	63	58	52	9	13	36	6	48	6	23	-	-	-											-						-	-		
8	5	63										-	-	-											-						-	-		
8	19	63										-	-	-											-						-	-		
9	2	63										-	-	-											-						-	-		
9	16	63										-	-	-											-						-	-		

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE OREGON

MAJOR BASIN CALIFORNIA

MINOR BASIN KLAMATH RIVER

STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

78

DATE OF SAMPLE					GALLONS FILTERED	EXTRACTABLES			CHLOROFORM EXTRACTABLES									
BEGINNING			END								NEUTRALS							
MONTH	DAY	YEAR	MONTH	DAY		TOTAL	CHLORO-FORM	ALCOHOL	ETHER INSOLUBLES	WATER SOLUBLES	TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	9	62	10	18	5877	126	43	83	0	13	14	1	1	11	1	4	3	1	8
11	12	62	11	20	4982	159	44	115	1	12	17	1	2	14	0	4	2	1	7
12	14	62	12	22	5342	136	26	110	-	-	-	-	-	-	-	-	-	-	-
1	10	63	1	17	5525	160	38	122	0	11	13	1	1	10	1	5	2	1	6
2	12	63	3	1	5093	199	50	149	-	-	-	-	-	-	-	-	-	-	-
3	11	63	3	19	5366	99	25	74	1	7	11	2	1	8	0	2	1	1	2
4	9	63	4	23	2666	227	64	163	-	-	-	-	-	-	-	-	-	-	-
5	6	63	5	14	5377	112	49	63	7	7	14	1	1	11	1	8	4	1	8
6	4	63	6	11	5093	165	77	88	-	-	-	-	-	-	-	-	-	-	-
7	2	63	7	8	4851	205	111	94	6	38	20	1	1	17	1	9	15	4	19
8	6	63	8	13	4980	141	81	60	-	-	-	-	-	-	-	-	-	-	-
9	2	63	9	10	4839	152	46	106	2	14	15	1	1	12	1	5	3	1	6
9	30	63	10	7	4308	281	95	186	-	-	-	-	-	-	-	-	-	-	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE OREGON

MAJOR BASIN CALIFORNIA

MINOR BASIN KLAMATH RIVER

STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

79

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	30	62	12.0	9.1	7.7	3.3	-	-	-	-	8	70	60	-	25	-	-	-	-
11	26	62	7.0	10.1	7.9	3.7	-	-	-	-	8	80	70	-	26	-	-	-	-
12	12	62	-	-	7.9	-	-	-	-	-	7	76	88	10	*25	31	.0	153	-
12	20	62	-	-	8.0	-	-	-	-	-	5	94	92	0	*25	38	.0	165	-
12	26	62	-	-	7.6	-	-	-	-	-	9	82	88	0	*25	33	.0	139	-
1	2	63	-	-	7.8	-	5	-	-	-	5	68	56	-	*25	22	.0	132	-
1	7	63	-	-	7.7	-	-	-	-	-	7	40	68	-	*25	38	.0	145	-
1	16	63	-	-	8.0	-	-	-	-	-	9	62	72	-	*25	45	.0	170	-
1	22	63	-	-	7.4	-	-	-	-	-	9	82	92	-	*25	62	.0	225	-
1	29	63	3.0	10.6	7.9	4.1	-	-	-	-	7	90	92	-	*25	62	.2	210	-
2	4	63	-	-	7.5	-	-	-	-	-	6	84	76	20	*25	44	.0	160	-
2	11	63	-	-	8.0	-	-	-	-	-	9	108	112	30	*25	69	.5	250	-
2	18	63	6.0	10.2	7.9	2.4	-	-	-	-	9	94	82	-	68	-	-	-	-
2	19	63	-	-	7.9	-	-	-	-	-	8	108	112	35	*25	74	.0	235	-
2	26	63	-	-	7.8	-	-	-	-	-	7	80	80	25	*25	35	.0	145	-
3	4	63	-	-	7.6	-	-	-	-	-	7	68	84	25	*25	37	.0	153	-
3	12	63	-	-	7.5	-	-	-	-	-	6	72	84	30	60	45	.0	168	-
3	19	63	-	-	6.9	-	-	-	-	-	7	84	100	35	65	60	.1	200	-
3	25	63	-	-	7.1	-	-	-	-	-	7	88	124	35	56	82	.1	230	-
4	1	63	-	-	7.1	-	-	-	-	-	9	88	116	30	58	100	.1	250	-
4	4	63	7.0	11.2	7.9	4.2	-	-	-	-	10	74	84	-	58	-	-	-	-
4	9	63	-	-	7.1	-	-	-	-	-	7	64	84	20	*25	40	.2	230	-
4	17	63	-	-	7.0	-	-	-	-	-	6	64	64	15	*25	33	.0	119	-
4	23	63	-	-	7.1	-	-	-	-	-	9	64	64	15	*25	30	.0	116	-
4	29	63	-	-	-	-	-	-	-	-	5	60	64	20	*25	20	.0	95	-
5	6	63	-	-	-	-	-	-	-	-	8	72	60	10	*25	26	.0	155	-
5	13	63	11.0	9.1	8.2	3.4	-	-	-	-	6	64	56	20	*25	23	.3	97	-
5	21	63	-	-	-	-	-	-	-	-	17	76	76	25	*25	55	.0	178	-
5	28	63	-	-	-	-	-	-	-	-	5	62	68	15	*25	20	.0	117	-
6	4	63	-	-	-	-	-	-	-	-	5	64	60	5	*25	14	.1	112	-
6	11	63	-	-	-	-	-	-	-	-	7	62	48	10	*25	12	.1	69	-
6	17	63	18.0	7.7	8.0	2.1	-	-	-	-	16	72	136	5	*25	64	.0	185	-
6	24	63	-	-	-	-	-	-	-	-	6	64	56	15	*25	9	.2	142	-
7	1	63	-	-	-	-	-	-	-	-	5	60	60	10	*25	8	.0	90	-
7	8	63	16.0	8.5	7.8	1.6	-	-	-	-	6	60	64	10	*25	9	.0	94	-
7	15	63	-	-	-	-	-	-	-	-	7	74	72	20	*25	20	.0	133	-
8	5	63	-	-	-	-	-	-	-	-	5	60	50	10	*25	12	.0	93	-
8	12	63	20.0	8.2	8.8	2.8	-	-	-	-	5	64	50	5	*25	13	.0	107	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE OREGON

MAJOR BASIN CALIFORNIA

MINOR BASIN KLAMATH RIVER

STATION LOCATION KLAMATH RIVER NEAR KENO, OREGON

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
8	19	63	-	-	-	-	-	-	-	-	8	62	46	10	*25	10	•0	108	-
8	26	63	-	-	-	-	-	-	-	-	5	68	56	10	*25	8	•1	168	-
9	2	63	-	-	-	-	-	-	-	-	6	72	54	20	*25	9	•2	127	-
9	10	63	18•0	8•3	7•9	3•0	-	-	-	-	4	70	52	10	*25	9	•2	120	-
9	16	63	-	-	-	-	-	-	-	-	5	74	64	20	*25	11	•2	133	-
9	23	63	-	-	-	-	-	-	-	-	5	68	48	10	*25	4	•2	118	-
9	30	63	-	-	-	-	-	-	-	-	5	64	48	10	*25	4	•2	112	-

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station below Big Bend powerplant
near Keno, Oregon
Operated by U.S. Geological Survey

STATE Oregon

MAJOR BASIN California

MINOR BASIN Klamath River

STATION LOCATION Klamath River near
Keno, Oregon

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	1.640	2.390	2.840	2.980	1.580	2.770	2.060	2.750	.752	.780	.719	1.140
2	1.460	2.150	2.840	2.850	2.080	2.770	1.760	2.750	.759	.776	.954	1.210
3	1.590	2.210	2.840	2.750	1.430	2.750	1.720	2.750	.759	.641	.662	1.230
4	1.560	2.160	3.180	2.750	1.420	2.770	1.630	2.800	.822	.638	.643	1.220
5	1.530	2.400	3.060	2.750	1.120	2.770	1.620	2.800	.746	.640	.987	1.220
6	1.590	2.340	2.840	2.750	.766	2.770	2.080	2.810	.766	.637	1.020	1.210
7	1.390	2.420	3.000	2.730	.766	2.770	2.750	2.840	.740	.646	1.000	1.160
8	1.520	2.370	2.980	2.610	.759	2.490	2.770	3.100	.746	.640	1.030	1.130
9	1.740	2.290	3.180	2.330	.759	2.380	2.750	3.520	.746	.647	1.020	1.140
10	1.180	2.340	3.120	2.480	.759	1.940	2.750	3.750	.746	.648	.742	1.190
11	1.370	2.460	3.180	2.430	.838	2.320	2.750	3.950	.716	.651	.662	1.190
12	2.570	2.460	3.200	2.440	.910	2.420	2.770	3.680	.632	.656	.990	1.210
13	3.060	2.640	3.180	2.160	1.050	2.430	2.680	3.410	.630	.644	1.070	1.310
14	3.180	2.670	3.200	2.480	1.330	2.430	2.570	3.430	.620	.654	1.100	1.040
15	3.410	2.600	3.220	2.360	1.630	2.290	2.730	3.300	.618	.655	1.130	1.060
16	3.040	2.540	3.270	1.780	1.240	2.520	3.390	3.090	.618	.657	1.130	1.310
17	2.810	2.490	3.460	1.750	.962	2.280	3.950	2.730	.624	.659	.766	1.620
18	2.810	2.220	3.600	1.700	1.680	2.570	4.000	1.720	.624	.658	.712	1.740
19	2.800	2.590	3.590	1.300	2.240	2.750	4.220	1.450	.622	.657	1.070	1.770
20	2.780	2.780	3.410	1.290	2.390	2.750	4.530	1.890	.624	.659	1.110	1.780
21	2.780	2.820	3.200	1.670	2.750	2.750	4.810	2.020	.637	.655	1.080	1.660
22	2.770	2.820	3.100	1.490	2.770	2.750	5.130	2.370	.636	.656	1.070	1.270
23	2.770	2.820	2.840	1.520	2.770	1.840	5.210	2.230	.627	.652	1.120	1.750
24	2.500	2.820	2.910	1.280	2.770	1.220	5.310	2.290	.639	.662	.957	1.800
25	2.570	2.820	2.960	1.160	2.700	1.930	4.800	2.280	.778	.662	.954	1.790
26	2.580	2.800	3.020	1.000	2.770	1.910	4.130	2.290	.775	.661	1.190	1.720
27	2.520	2.630	3.100	.800	2.770	1.780	3.590	2.370	.636	.659	.766	1.580
28	2.430	2.740	3.150	1.380	2.780	1.960	2.850	2.290	.642	.660	.806	1.720
29	2.540	2.820	3.200	1.270		1.940	2.850	2.000	.639	.664	.938	1.280
30	2.560	2.820	3.160	1.330		1.860	2.750	1.260	.629	.664	.982	1.840
31	2.460		3.140	1.170		1.870		1.100		.653	1.000	

SACRAMENTO RIVER AT GREEN'S LANDING ABOVE COURTLAND, CALIFORNIA

Samples are collected at the U.S. Bureau of Reclamation instrument house on the east bank. Water levels and currents at this station are affected by semidiurnal tides. There are, however, no measurable ocean salts in the water. The water at Green's Landing is affected by organic loadings from the city of Sacramento's primary sewage treatment plant 17 miles upstream and, in season, from a beet sugar plant 6 miles upstream. Inorganic loadings derive from upstream discharges of irrigation drainage.

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Station Location:	Sacramento River at Green's Landing above Courtland, California
Major Basin:	California
Minor Basin:	Sacramento River
Station at:	38°20' Latitude 121°34' Longitude
Miles above mouth:	37
Activation Date:	May 31, 1962
Sampled by:	California Department of Water Resources
Field Analysis by:	California Department of Water Resources
Other Cooperating Agencies:	California State Department of Health U.S. Bureau of Reclamation
Hydrologic Data:	
Nearest pertinent gaging station:	At Sacramento, California
Gaging station operated by:	U.S. Geological Survey in cooperation with Department of Water Resources
Drainage area at gaging station:	5,000 square miles (estimated)
Period of record:	1948 to present
Average discharge in record period:	22,700 cfs.

Maximum discharge in record period: 104,000 cfs.

Minimum discharge in record period: 5,590 cfs.

Remarks: Flow affected by irrigation diversions and return flow, power plants and storage reservoirs.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.15	.10
	Na	8.0	7.1
	K	1.7	1.0
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	24	7
	Cd	*1	*2
	As	*9	*10
	B	36	56
	P	95	32
	Fe	108	26
	Mo	18	*4
	Mn	.8	1.6
	Al	—	28
	Be	*.02	*.04
	Cu	6	13
	Ag	*.2	*.4
	Ni	*1	2
	Co	*2	*2
	Pb	2	6
	Cr	*1	*4
	V	*1	*8
	Ba	38	20
	Sr	54	35

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.2	April to June	—	—
January to March	—	—	July to September	1.4	.5

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
7/2 - 7/11/63	Dieldrin	0.003
7/2 - 7/11/63	DDT	0.006
7/2 - 7/11/63	DDD	0.002
8/7 - 8/15/63	Dieldrin	0.005
8/7 - 8/15/63	DDT	0.006
8/7 - 8/15/63	DDD	0.001

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.

See page 21.

RADIOACTIVITY DETERMINATIONS

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SACRAMENTO RIVER

STATION LOCATION SACRAMENTO RIVER AT GREENS LANDING ABOVE COURTLAND, CALIFORNIA

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO	DAY	YR	MO	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	2	62	12	13	0	0	0	1	0	1	1	6	6	7	7	9						
10	9	62	11	21	0	1	0	0	0	1	1	6	11	7	12	9						
10	29	62	11	26	0	1	3	3	3	3	11	6	13	8	24	10						
10	31	62	12	18	2	1	0	1	2	1	29	9	2	6	31	11						
11	5	62	11	29	1	1	0	1	1	1	6	7	5	7	11	10						
11	15	62	11	13	1	1	0	1	1	1	14	9	12	7	26	11						
11	19	62	12	6	0	1	0	0	0	1	7	6	139	9	146	11						
11	26	62	12	18	0	1	4	4	4	4	21	13	29	18	50	22						
12	3	62	1	3	0	1	0	1	0	1	6	7	4	6	10	9						
12	14	62	1	7	5	4	0	1	5	4	37	11	7	4	44	12						
12	17	62	1	7	24	24	0	1	24	24	198	62	9	4	207	63						
12	28	62	1	14	7	6	0	1	7	6	27	20	11	3	38	20						
1	3	63	1	21	2	4	1	1	3	4	29	18	11	3	40	18						
1	7	63	1	24	0	1	0	1	0	1	3	8	7	7	10	11						
1	14	63	1	30	0	0	0	0	0	0	4	6	9	7	13	9						
1	21	63	2	6	1	1	1	1	2	1	0	7	6	7	6	10						
1	28	63	2	14	1	2	0	2	1	3	24	10	14	7	38	12						
2	4	63	2	25	0	1	3	5	3	5	74	13	26	4	100	14						
2	11	63	3	4	0	2	0	1	0	2	43	5	18	3	61	6						
2	18	63	3	7	2	2	0	1	2	2	45	9	24	7	69	11						
2	25	63	3	15	1	2	0	1	1	2	22	8	11	6	33	10						
3	4	63	3	27	1	1	1	1	2	1	10	7	13	6	23	9						
3	11	63	4	1	0	1	2	1	2	1	6	3	13	3	19	4						
3	19	63	4	5	2	1	0	0	2	1	13	5	17	6	30	8						
3	25	63	4	10	1	1	1	1	2	1	27	7	18	7	45	10						
4	30	63	6	3*	2	2	0	1	2	2	80	5	21	3	101	6						
5	27	63	6	25*	0	1	0	1	0	1	13	7	8	6	21	9						
6	24	63	8	6*	1	2	0	1	1	2	14	14	7	7	21	16						
7	29	63	8	27*	1	1	0	1	1	1	15	8	15	7	30	11						
8	26	63	10	14*	2	2	0	1	2	2	22	8	7	4	29	9						
9	30	63	11	20*	2	2	0	1	2	2	98	14	15	6	113	15						

PLANKTON POPULATION

STATE CALIFORNIA
MAJOR BASIN CALIFORNIA
MINOR BASIN SACRAMENTO RIVER
STATION LOCATION SACRAMENTO RIVER AT GREENS LANDING ABOVE COURTLAND, CALIFORNIA

DATE OF SAMPLE			ALGAE (Number per milliliter)								INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS			1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	2	62	700	0	0	120	0	0	20	270	290	110	260																		
10	16	62	1600	0	0	0	0	0	0	270	1330	0	580	92	1	69	1	88	1	79	1										
11	5	62	200	0	0	0	20	20	0	50	80	60	200																		
11	19	62	900	0	0	0	0	0	0	150	750	40	210	92	1																
12	3	62	200	0	0	0	0	20	0	50	150	0	150																		
12	17	62	1000	0	0	20	0	40	0	290	620	150	1140	69	1	84	1														
1	7	63	100	0	0	0	0	0	0	20	110	20	290																		
1	21	63	200	0	60	0	0	40	0	20	60	40	320																		
2	5	63	100	0	0	0	0	0	0	70	20	110	330																		
2	18	63	300	0	20	0	0	0	60	80	110	110	270																		
3	4	63	200	0	40	0	0	40	0	60	60	40	440																		
3	19	63	300	0	20	20	0	90	0	40	90	0	70																		
4	1	63	400	0	0	20	0	40	20	110	250	40	290																		
4	15	63	700	0	0	40	0	0	380	80	230	40	130	62	2																
5	6	63	500	0	0	20	0	20	0	310	110	0	110	71	1																
5	20	63	200	0	0	0	0	0	0	40	110	20	150																		
6	3	63	400	0	0	20	0	0	0	180	150	40	180																		
6	17	63	1900	0	0	300	0	180	0	790	630	210	180	88	2	69	2	71	2												
8	5	63	700	0	0	60	150	40	0	410	80	80	230																		
8	19	63	1800	20	0	820	0	40	0	620	280	150	390	25	2																
9	3	63	800	20	0	170	0	90	20	390	90	170	300	69	1																
9	16	63	500	0	20	180	0	20	0	90	200	20	430																		

PLANKTON POPULATION

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SACRAMENTO RIVER

STATION LOCATION SACRAMENTO RIVER AT GREENS LANDING ABOVE COURTLAND, CALIFORNIA

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH		OTHER SPECIES PERCENT		ROTIFERS												CRUSTACEA								NEMATODES (Identifiable) Number per liter	OTHER ANIMAL FORMS (Number per liter)
															GENERA AND COUNT LEVEL (See text for Codes)												GENERA AND COUNT LEVEL (See text for Codes)							
															1ST		2ND		3RD		4TH		5TH				1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT			PROTOZOA (Identifiable) Number per ml.	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	2	62	56	78	10	5	62	3	92	3	11	–	–	0											0							0	0
10	16	62	56	10	46	10	92	7	47	6	67	–	–	0											0							0	0
11	5	62	56	30	46	22	92	6	62	5	37	–	–	0											0							0	0
11	19	62	56	47	92	10	46	7	62	6	30	–	–	0											0							0	0
12	3	62	56	52	92	14	46	6	47	4	24	–	–	0											0							0	0
12	17	62										–	–	–											–							–	–
1	7	63										–	–	0											1							0	0
1	21	63										60	0	0											0							0	0
2	5	63										–	–	–											–							–	–
2	18	63	92	10	95	8	62	7	71	5	70	–	–	0											0							0	0
3	4	63	71	15	92	15	62	9	78	6	55	–	–	0											0							0	0
3	19	63	92	20	71	11	82	9	36	6	54	–	–	0											0							1	0
4	1	63	92	24	71	19	56	6	62	6	45	–	–	0											0							0	0
4	15	63	56	15	92	10	21	7	53	6	62	–	–	1											0							0	0
5	6	63	82	23	92	10	56	8	70	5	54	–	–	–											–							–	–
5	20	63	92	24	62	6	36	6	56	5	59	–	–	–											–							–	–
6	3	63	92	9	26	8	16	4	71	4	75	–	–	–											–							–	–
6	17	63	82	44	26	14	70	6	88	6	30	–	–	–											–							–	–
8	5	63										–	–	–											–							–	–
8	19	63										–	–	–											–							–	–
9	3	63										–	–	–											–							–	–
9	16	63										–	–	–											–							–	–

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SACRAMENTO RIVER

STATION LOCATION SACRAMENTO RIVER AT GREENS LANDING ABOVE COURTLAND, CALIFORNIA

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLOROFORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGENATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
11	27	62	12	6	6450#	108	21	87	0	4	9	1	1	7	0	3	1	1	3
1	3	63	1	11	5040	93	14	79	0	2	8	2	1	5	0	2	1	0	1
2	8	63	2	18	3463	171	64	107	2	19	16	1	1	14	0	7	6	2	12
2	27	63	3	5	3759	103	19	84	0	5	9	1	1	6	1	3	1	0	1
4	3	63	4	15	6500#	94	27	67	1	7	9	2	1	6	0	4	2	1	3
5	15	63	5	27	7500#	66	32	34	3	8	7	1	1	5	0	4	4	1	5
6	11	63	6	19	4280	128	42	86	3	11	12	2	1	9	0	5	4	1	6
7	2	63	7	11	5700#	107	41	66	1	12	11	1	1	9	0	5	4	1	7
8	7	63	8	15	5083	118	46	72	1	13	14	1	2	11	0	4	5	1	8
9	16	63	9	23	4242	106	25	81	0	6	9	1	1	7	0	3	2	1	4

ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SACRAMENTO RIVER

STATION LOCATION SACRAMENTO RIVER AT GREENS LANDING ABOVE COURTLAND, CALIFORNIA

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 mL
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	5	62	21.0	7.7	7.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	6600
10	20	62	-	-	-	-	-	-	-	-	10	68	64	5	89	15	-	-	-
11	9	62	15.0	9.0	7.3	1.4	-	-	-	-	-	-	-	-	-	-	-	-	16000
12	4	62	11.7	10.4	7.3	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
12	14	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3200
1	11	63	7.2	11.1	7.4	1.8	-	-	-	-	-	-	-	-	-	-	-	-	30000
2	15	63	11.7	10.3	7.3	1.2	-	-	-	-	-	-	-	-	-	-	-	-	28000
3	8	63	11.7	10.7	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	8400
4	5	63	12.8	10.1	7.5	1.5	-	-	-	-	-	-	-	-	-	-	-	-	1500
4	15	63	-	-	7.3	-	-	-	-	-	5	48	48	5	170	7	.0	65	-
4	22	63	-	-	7.2	-	-	-	-	-	3	48	60	10	*25	4	.0	138	-
4	30	63	-	-	-	-	-	-	-	-	6	52	56	5	*25	6	.0	74	-
5	3	63	17.2	9.6	7.2	3.2	-	-	-	-	-	-	-	-	-	-	-	-	7200
5	6	63	-	-	-	-	-	-	-	-	8	52	60	0	*25	6	.0	73	-
5	13	63	-	-	-	-	-	-	-	-	6	28	44	5	*25	4	.0	72	-
5	20	63	-	-	-	-	-	-	-	-	5	44	44	5	*25	6	.0	129	-
5	27	63	-	-	-	-	-	-	-	-	3	48	56	15	*25	5	.0	74	-
6	3	63	-	-	-	-	-	-	-	-	8	48	64	0	*25	11	.0	74	-
6	7	63	18.3	8.0	7.3	1.9	-	-	-	-	-	-	-	-	-	-	-	-	3100
7	12	63	21.1	8.1	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	500
8	9	63	21.7	7.2	7.3	1.3	-	-	-	-	-	-	-	-	-	-	-	-	4300
8	19	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3000
9	13	63	20.6	5.7	7.3	3.3	-	-	-	-	-	-	-	-	-	-	-	-	1000000

736-501 O - 64 - 4

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Sacramento, California
Operated by U.S. Geological Survey

STATE California

MAJOR BASIN California

MINOR BASIN Sacramento River

STATION LOCATION Sacramento River at Greens Landing above Courtland, Calif.

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	9.970	19.400	20.100	24.400	71.100	30.300	56.800	49.200	33.300	13.100	10.400	12.500
2	9.810	18.500	19.700	24.100	94.400	29.000	52.100	47.700	32.000	13.200	10.400	12.500
3	9.680	18.200	21.000	23.800	81.800	28.300	47.300	46.100	29.800	13.000	10.600	12.700
4	9.360	17.800	31.500	23.300	78.800	27.800	42.400	45.300	26.000	13.200	10.800	13.000
5	9.330	17.600	38.000	23.100	76.400	26.800	37.800	44.500	21.000	13.200	11.100	13.400
6	9.070	17.400	36.500	22.800	68.600	25.800	36.600	44.200	18.800	13.200	11.500	13.400
7	8.980	17.100	32.700	22.400	63.800	23.800	55.400	44.400	18.300	13.000	11.400	13.500
8	8.910	16.500	28.900	21.800	62.100	21.800	69.700	44.800	17.400	13.000	11.200	14.300
9	8.720	16.200	24.100	21.600	60.500	20.200	75.200	46.600	17.000	12.900	11.200	14.800
10	8.840	16.000	22.500	21.200	59.100	18.600	75.200	48.500	16.600	12.900	11.300	14.800
11	9.060	16.100	21.400	20.900	57.200	17.400	74.600	49.400	16.100	12.900	11.500	15.400
12	11.000	16.600	20.600	20.600	56.200	16.700	74.200	49.600	16.100	12.600	11.900	16.100
13	36.000	16.100	20.100	19.700	57.800	16.400	72.700	48.100	15.800	12.400	11.800	17.200
14	70.400	15.600	19.400	18.300	59.900	15.700	68.700	45.800	15.500	12.200	11.700	17.900
15	76.200	15.600	18.500	18.200	59.200	15.700	68.600	42.600	16.300	12.300	11.200	18.900
16	70.500	15.500	25.000	17.900	57.100	16.300	69.000	40.100	18.100	12.200	11.100	19.200
17	65.500	16.000	35.500	17.300	55.300	16.500	68.600	38.700	17.900	11.800	11.300	18.800
18	60.800	15.600	44.400	16.700	53.400	17.300	67.700	38.500	17.100	11.500	11.200	18.600
19	55.600	15.700	50.000	16.400	51.500	16.900	66.800	38.900	16.900	11.600	11.500	18.700
20	48.700	15.700	52.600	15.900	49.100	16.500	67.600	40.000	15.500	11.500	11.500	18.500
21	40.800	15.500	52.300	15.700	46.300	16.000	67.200	43.000	14.600	11.600	11.400	18.300
22	34.800	15.000	49.700	15.400	43.000	16.500	66.100	43.600	14.000	11.800	11.700	18.400
23	31.600	15.000	46.000	15.500	39.200	16.900	64.600	43.400	13.900	11.800	11.700	18.100
24	28.300	15.100	42.200	15.100	36.100	21.100	63.000	42.500	13.600	11.400	11.800	18.000
25	25.900	15.000	38.600	14.900	35.100	23.100	61.200	40.700	13.100	11.400	11.800	17.500
26	24.500	15.000	35.300	15.000	33.800	22.400	60.000	39.100	13.100	11.700	11.800	17.200
27	23.200	15.000	32.900	14.600	32.300	22.500	58.400	37.800	13.000	11.400	12.100	16.800
28	22.400	19.300	29.900	14.400	31.400	31.000	56.400	36.800	12.600	11.300	12.200	16.400
29	21.300	21.700	29.100	14.700		52.600	53.800	35.400	12.300	11.000	12.200	16.100
30	20.400	21.300	25.900	19.000		59.000	51.300	36.000	12.400	10.700	12.000	15.500
31	19.700		25.100	33.200		58.300		35.000		10.600	12.200	

SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA

The PHS Water Pollution Surveillance System station near Vernalis provides data on the San Joaquin River just before it enters the tidal waters of the Sacramento-San Joaquin delta. Samples are collected from the San Joaquin city bridge.

During the winter rainy season and when large irrigation releases are being made from upstream reservoirs, the water is of excellent quality. During low-flow months, flows in the lower reach of the San Joaquin River are made up entirely of irrigation return waters having excessive concentrations of salts.

Station Location:	San Joaquin River Near Vernalis, California
Major Basin:	California
Minor Basin:	San Joaquin River
Station at:	37°45' Latitude 121°20' Longitude
Miles above mouth:	67
Activation Date:	June 25, 1962
Sampled by:	California Department of Water Resources
Field Analysis by:	California Department of Water Resources
Other Cooperating Agencies:	California State Department of Health
Hydrologic Data:	
Nearest pertinent gaging station:	Near Vernalis, California
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	14,010 square miles
Period of record:	1924, 1929 to present
Average discharge in record period:	4,459 cfs.

Maximum discharge in record period: 79,000 cfs.

Minimum discharge in record period: 19 cfs.

Remarks: Flow affected by power plants, storage reservoir, irrigation demands and return flow. Low flow is mainly irrigation return flow.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.20	*.05
	Na	85	18
	K	4.2	1.7
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	40	3
	Cd	*4	*2
	As	*40	*20
	B	200	153
	P	*10	*10
	Fe	60	19
	Mo	*4	*5
	Mn	*2	*2
	Al	—	10
	Be	*.1	*.05
	Cu	7	14
	Ag	*.8	*.5
	Ni	*4	*2
	Co	*8	*2
	Pb	*10	*5
	Cr	*2	*5
	V	*4	*10
	Ba	124	37
	Sr	560	94

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	1.0	.2	April to June	1.3	.2
January to March	—	—	July to September	—	—

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l
10/8 - 10/24/62	DDT	
7/2 - 7/11/63	Dieldrin	0.001
7/2 - 7/11/63	DDT	0.007
7/2 - 7/11/63	DDD	0.006
8/6 - 8/15/63	Dieldrin	0.001

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.

See page 21.

RADIOACTIVITY DETERMINATIONS

STATE CALIFORNIA
MAJOR BASIN CALIFÓRNIA
MINOR BASIN SAN JOAQUIN RIVER
STATION LOCATION SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA

DATE SAMPLE TAKEN			DATE OF DETERMI-NATION		RADIOACTIVITY IN WATER												DATE OF DETERMI-NATION		RADIOACTIVITY IN PLANKTON			
					ALPHA						BETA								GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	3	62	10	26	1	1	3	3	4	3	10	12	81	18	91	21						
10	10	62	11	5	0	1	8	4	8	4	7	12	31	19	38	22						
10	17	62	11	16	0	1	1	1	1	1	4	5	11	8	15	9						
10	24	62	11	21	1	1	3	3	4	3	11	12	23	16	34	18						
10	31	62	11	28	0	1	4	4	4	4	20	12	9	17	29	21						
11	8	62	12	26	1	1	5	3	6	3	9	8	18	11	27	14						
11	14	62	12	26	0	1	4	3	4	3	43	9	20	11	63	14						
11	20	62	12	17	1	1	6	3	7	3	56	12	31	13	87	18						
11	28	62	1	4	0	1	1	1	1	1	7	6	16	8	23	10						
12	5	62	1	2	1	1	2	1	3	1	1	5	9	6	10	8						
12	12	62	1	9	0	1	0	1	0	1	3	6	4	8	7	10						
12	19	62	1	9	2	3	1	1	3	3	20	34	17	9	37	35						
12	27	62	1	16	1	1	2	2	3	2	4	12	17	14	21	18						
1	3	63	1	18	1	1	2	2	3	2	10	13	16	15	26	20						
1	10	63	1	25	0	1	3	2	3	2	2	12	63	17	65	21						
1	16	63	2	5	0	1	6	4	6	4	15	12	12	16	27	20						
1	23	63	2	11	0	1	3	3	3	3	5	6	17	9	22	11						
1	30	63	2	14	0	2	0	3	0	3	25	24	30	27	55	36						
2	6	63	2	25	3	2	0	1	3	2	27	9	28	4	55	10						
2	20	63	3	11	1	1	1	1	2	1	38	4	42	4	80	6						
2	27	63	3	22	3	1	2	1	5	1	27	8	23	8	50	11						
3	6	63	3	27	1	1	3	1	4	1	6	12	15	10	21	16						
3	13	63	3	28	1	1	3	2	4	2	10	12	22	15	32	19						
3	20	63	4	5	0	1	3	3	3	3	17	12	36	17	53	21						
3	27	63	4	16	1	1	5	3	6	3	18	12	29	17	47	21						
4	25	63	6	3*	1	1	0	1	1	1	31	4	25	4	56	6						
5	28	63	7	1*	1	1	0	1	1	1	20	3	21	3	41	4						
6	26	63	8	6*	1	1	0	1	1	1	9	7	20	8	29	11						
7	10	63	9	20	1	1	2	2	3	2	4	10	11	12	15	16						
8	7	63	10	14	0	1	9	4	9	4	5	6	23	9	28	11						
9	11	63	11	20	1	1	5	4	6	4	12	10	25	13	37	16						

PLANKTON POPULATION

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SAN JOAQUIN RIVER

STATION LOCATION SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA

122

DATE OF SAMPLE			ALGAE (*Number per milliliter*)										INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - *Genera and Count Level per ml. (See text for Codes)*																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (*Pigmented*)		DIATOMS					1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	3	62	8700	70	270	1710	0	1510	0	3920	1190	340	520		69	4	68	4	51	4	26	3	17	1	24	1	38	1	27	1				
10	17	62	1200	0	20	90	0	330	20	570	170	90	170		68	2																		
11	8	62	1200	80	30	150	0	60	20	520	330	180	330		68	1	69	1																
11	20	62	600	0	20	50	0	50	20	230	240	0	150																					
12	5	62	1200	0	0	120	0	120	0	100	830	0	80		84	2																		
12	19	62	1100	0	50	160	0	0	0	560	290	160	510		69	1																		
1	10	63	900	0	0	70	0	20	0	570	240	70	110		71	2																		
1	23	63	3100	0	290	0	0	440	40	530	1760	150	690		78	3	88	2	51	2	87	1	76	1	17	1	68	1						
2	5	63	1000	0	0	0	0	200	0	420	400	110	640		69	2	84	1																
2	20	63	800	0	40	60	0	170	190	110	190	380	530		60	1																		
3	6	63	1400	0	0	90	0	290	200	420	420	110	440		68	1	52	1	60	1														
3	20	63	11300	1300	400	1130	0	1180	480	5990	860	500	880		69	5	68	4	3	4	71	3	51	3	26	2	52	2	62	2	17	2	88	1
4	3	63	3900	20	0	290	0	220	90	2860	370	240	700		69	4	68	3																
4	17	63	1700	20	0	110	0	40	0	1010	510	90	370		68	2	69	2	92	1														
5	1	63	1500	0	20	40	0	110	0	1100	180	260	370		68	3	71	1	67	1														
5	22	63	700	0	0	0	0	70	0	510	110	40	290		68	2																		
6	5	63	1300	20	0	90	0	130	0	840	240	290	460		71	2	68	2																
6	12	63	1700	0	70	90	0	350	70	770	350	310	680		68	2	51	1	69	1	71	1												
8	7	63	40000	20	60	2840	0	560	410	35170	930	950	250		69	8	38	4	65	2	51	2	25	2	34	1	29	1	24	1				
9	11	63	12100	960	20	1330	0	500	50	7880	1310	860	1010		3	3	51	2	69	2	38	1	24	1	25	1								

PLANKTON POPULATION

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SAN JOAQUIN RIVER

STATION LOCATION SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA 122

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH				PROTOZOA (Identifiable) (Number per ml.)	ROTIFERS										CRUSTACEA								NEMATODES (Identifiable) (Number per liter)	OTHER ANIMAL FORMS (Number per liter)
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)										NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)									
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	3	62	26	54	20	8	10	5	13	2	31	-	-	295	11	5	2	4	20	4	21	2	15	2	0							0	1
10	17	62	26	29	10	13	46	9	30	8	41	50	-	11	11	1									0							0	0
11	8	62	26	21	48	21	46	11	92	9	38	-	-	2											0							0	2
11	20	62	46	46	82	14	26	9	92	5	26	30	-	4											1							0	0
12	5	62	46	51	10	6	26	5	56	5	33	-	-	0											0							0	0
12	19	62	46	27	48	16	92	11	62	5	41	-	-	0											0							0	0
1	10	63	82	24	46	14	64	11	10	6	45	-	-	0											0							0	0
1	23	63	12	29	46	9	71	7	8	7	48	-	-	1											0							1	0
2	5	63	46	40	56	13	92	7	62	6	34	-	-	0											0							0	0
2	20	63	46	35	92	9	62	7	41	5	44	-	-	3											0							0	0
3	6	63	46	19	26	12	92	11	10	5	53	-	-	0											0							0	0
3	20	63	46	20	26	14	10	8	82	7	51	-	-	2											0							0	0
4	3	63	26	46	46	10	92	7	62	4	33	-	-	2											0							0	0
4	17	63	29	30	30	13	49	9	92	8	41	-	-	2											0							0	0
5	1	63	26	30	92	15	62	9	46	9	37	-	-	-											-							-	-
5	22	63	26	26	48	9	46	9	47	8	48	-	-	-											-							-	-
6	5	63	82	18	26	15	46	12	2	4	51	-	-	-											-							-	-
6	12	63	46	24	26	19	82	10	70	9	38	-	-	-											-							-	-
8	7	63										-	-	-											-							-	-
9	11	63										-	-	-											-							-	-

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE CALIFORNIA

MAJOR BASIN CALIFORNIA

MINOR BASIN SAN JOAQUIN RIVER

STATION LOCATION SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA

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DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLOROFORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGENATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
10	8	62	10	24	10328	89	21	68	0	4	10	1	1	8	0	3	1	0	3
11	27	62	12	6	5989	150	24	126	0	6	10	1	1	8	0	3	1	1	3
1	3	63	1	10	4575	183	43	140	1	11	12	1	1	10	0	5	4	1	9
3	4	63	3	11	4573#	192	48	144	1	13	14	0	2	10	2	5	4	1	10
4	3	63	4	16	7177	109	42	67	1	11	13	1	1	10	1	5	3	1	8
7	2	63	7	11	5770	126	47	79	1	15	12	0	1	10	1	5	5	1	8
8	6	63	8	15	5800#	133	36	97	1	8	12	1	1	10	0	4	3	1	7
9	16	63	9	23	4093	133	28	105	1	7	10	1	1	8	0	3	2	1	4

ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE: CALIFORNIA
MAJOR BASIN: CALIFORNIA
MINOR BASIN: SAN JOAQUIN RIVER
STATION LOCATION: SAN JOAQUIN RIVER NEAR VERNALIS, CALIFORNIA

122

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	3	62	20.6	7.7	7.4	3.2	11	3.6	6.8	.0	159	174	201	-	30	64	.3	-	2000
10	10	62	19.4	7.7	7.1	2.6	10	.9	6.0	.0	170	173	215	5	40	71	.2	584	4200
10	17	62	15.6	7.6	7.3	1.9	12	2.9	5.9	.2	90	96	115	5	20	38	.3	423	9000
10	24	62	17.8	7.6	7.3	2.5	8	3.3	5.3	.2	152	141	190	0	20	67	.1	485	7000
10	31	62	16.1	7.8	7.3	2.4	7	2.6	5.1	.1	132	127	163	0	20	66	.0	402	4800
11	8	62	15.6	8.1	7.3	1.7	6	2.8	5.6	.2	136	124	168	0	25	67	.0	426	23000
11	14	62	15.0	7.7	7.3	1.5	9	3.7	8.3	-	123	123	171	5	20	57	.1	402	60000
11	20	62	12.2	8.6	7.3	1.3	5	3.0	5.4	.0	127	121	163	0	25	55	.2	414	9000
11	28	62	13.3	8.2	7.3	2.2	7	3.7	6.5	.1	84	69	114	5	25	29	.0	237	-
12	5	62	12.8	7.9	7.0	2.3	18	.6	2.4	.0	68	73	87	10	15	32	.1	223	72000
12	12	62	10.5	9.3	7.0	1.6	21	1.5	2.9	.0	54	56	72	10	30	25	.0	193	21000
12	19	62	12.8	7.9	7.1	1.7	17	3.0	6.7	.1	78	77	94	10	25	41	.0	269	-
12	27	62	8.3	9.6	7.2	1.6	6	1.7	4.0	.1	87	101	117	5	5	51	.0	324	-
1	3	63	7.8	9.7	7.3	2.0	6	2.0	5.1	.1	108	111	144	15	8	62	.1	374	-
1	10	63	9.4	9.6	7.7	2.4	8	3.0	5.7	.5	99	106	139	0	28	67	.0	334	-
1	16	63	6.1	10.4	7.5	2.1	11	3.9	7.8	.2	139	145	194	0	25	89	.4	521	100000
1	23	63	8.3	10.5	7.3	1.9	10	1.3	5.7	.1	163	146	194	10	7	109	-	539	110000
1	30	63	9.4	9.5	7.3	2.1	7	1.4	4.8	.0	168	143	208	5	10	118	.2	633	250000
2	6	63	11.7	7.6	6.8	2.2	19	-	-	.1	18	41	43	80	60	15	.1	121	-
2	20	63	12.2	9.3	7.8	1.6	24	2.7	6.7	.1	30	46	58	140	45	31	.4	173	50000
2	27	63	12.8	8.5	7.2	1.8	18	3.5	7.8	.1	58	62	86	20	55	50	.4	203	30000
3	6	63	12.8	8.8	7.5	2.3	10	3.8	8.0	.2	119	99	152	15	40	89	.3	453	20000
3	13	63	13.9	9.1	7.4	2.2	12	3.0	8.6	.0	136	92	172	15	70	95	.3	479	15000
3	20	63	15.0	9.4	7.5	2.8	15	2.9	7.6	.0	166	106	199	15	20	115	.5	570	*200
3	27	63	15.0	8.7	7.4	3.4	20	3.9	8.5	.0	154	117	207	15	20	126	.5	578	20000
4	3	63	13.3	10.1	7.3	3.0	15	3.4	8.0	.0	40	49	74	20	30	35	.4	198	30000
4	10	63	13.3	9.7	-	2.0	13	1.9	4.6	.1	21	38	50	20	35	18	.2	113	-
4	17	63	12.8	9.9	7.3	2.2	12	2.1	5.3	.0	25	39	54	20	40	21	.2	126	36000
4	25	63	11.7	6.8	7.2	2.2	15	3.0	5.9	.0	18	42	50	25	40	15	.3	117	68000
5	1	63	16.1	9.4	7.3	2.7	14	2.6	6.6	.0	21	44	54	25	30	18	.3	122	240000
5	8	63	12.8	9.4	7.5	1.5	9	.7	2.2	.0	26	48	63	20	25	21	.3	144	550000
5	15	63	17.2	9.9	7.3	1.7	12	1.6	3.8	.0	19	39	48	20	70	22	.2	107	92000
5	22	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70000
5	29	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10000
6	5	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10000
6	12	63	18.3	9.0	7.0	6.6	9	2.9	6.8	.0	18	30	36	15	18	9	.2	90	20000
6	20	63	21.7	7.5	7.1	1.7	9	1.9	3.8	.0	29	39	50	15	25	9	.2	122	15000
6	26	63	21.1	8.4	7.3	1.9	10	1.9	3.5	.0	47	62	85	10	-	36	.3	-	-
7	10	63	22.8	8.6	7.3	3.6	21	3.5	7.8	.0	92	93	158	10	-	56	.3	396	900
8	7	63	24.4	9.8	-	6.2	20	2.6	6.9	.0	164	140	214	20	-	65	.4	535	500
9	11	63	24.5	8.5	9.0	5.6	20	2.0	5.5	.0	135	86	168	15	-	57	.4	453	10000

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Vernalis, California
Operated by U.S. Geological Survey

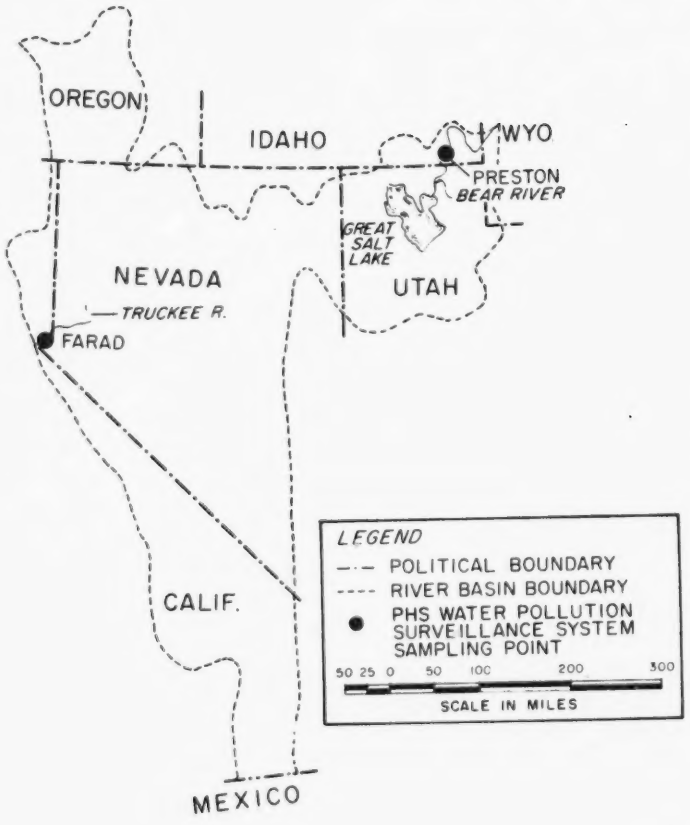
STATE California

MAJOR BASIN California

MINOR BASIN San Joaquin River

STATION LOCATION San Joaquin River near Vernalis, California

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	1.160	1.570	2.520	2.190	1.920	4.390	8.730	8.380	13.000	3.490	1.020	1.140
2	1.190	1.570	2.480	2.180	3.330	3.950	7.720	7.540	12.500	3.130	1.020	1.200
3	1.200	1.570	2.160	1.940	9.220	3.620	6.120	6.500	11.600	2.970	1.000	1.210
4	1.220	1.570	1.970	2.270	12.100	3.300	5.610	6.750	10.800	2.370	1.020	1.200
5	1.260	1.550	2.180	2.270	12.000	2.720	5.190	6.840	9.410	2.240	1.100	1.200
6	1.260	1.470	2.310	2.000	11.700	2.620	4.120	6.930	7.810	2.130	1.120	1.200
7	1.330	1.400	2.480	1.720	11.000	2.450	3.870	6.800	6.430	2.020	1.080	1.190
8	1.300	1.420	2.620	1.670	8.700	2.290	6.260	6.910	5.810	2.360	1.080	1.220
9	1.140	1.450	2.570	1.960	7.500	2.180	8.360	7.190	6.050	2.350	1.080	1.270
10	1.050	1.470	2.290	2.090	7.700	2.060	9.860	7.720	6.370	2.210	1.120	1.290
11	1.110	1.480	2.120	2.000	9.100	1.930	9.440	8.650	6.540	2.410	1.220	1.280
12	1.260	1.490	2.480	2.090	9.700	1.750	11.200	10.800	7.780	2.180	1.280	1.240
13	1.650	1.500	2.450	2.130	8.700	1.860	12.500	12.200	7.000	2.210	1.150	1.260
14	1.940	1.510	2.430	1.910	9.700	1.610	10.700	11.600	4.550	2.050	1.100	1.340
15	2.070	1.540	2.290	1.690	11.900	1.460	8.350	9.790	3.540	1.900	1.050	1.450
16	2.100	1.570	2.240	1.630	11.200	1.450	9.810	8.150	4.760	1.760	1.080	1.630
17	1.970	1.600	2.130	1.630	9.970	1.790	10.600	6.910	5.510	1.640	1.080	1.780
18	1.760	1.600	1.980	1.640	9.280	2.440	8.940	6.050	4.940	1.580	1.100	1.780
19	1.630	1.590	2.360	1.590	8.660	2.150	7.810	6.490	6.060	1.460	1.100	1.800
20	1.550	1.550	2.590	1.590	8.650	1.780	7.970	8.310	6.410	1.350	1.100	1.800
21	1.520	1.580	2.790	1.530	7.550	1.570	9.100	9.490	8.080	1.320	1.080	1.840
22	1.480	1.590	3.010	1.470	6.690	1.420	10.300	10.200	9.010	1.350	1.060	1.920
23	1.370	1.610	3.110	1.470	6.350	1.450	10.400	10.900	8.330	1.300	1.060	2.060
24	1.300	1.580	2.890	1.500	5.950	1.560	10.400	11.200	6.350	1.200	1.090	1.980
25	1.320	1.720	2.670	1.470	5.420	1.910	9.840	11.900	5.070	1.080	1.120	1.920
26	1.380	1.930	2.590	1.500	5.100	1.930	9.600	12.500	3.910	1.080	1.180	1.860
27	1.430	1.890	2.260	1.500	4.930	1.760	9.690	12.700	3.360	1.050	1.150	1.770
28	1.480	2.200	2.430	1.410	4.670	1.790	9.550	12.300	2.910	1.080	1.060	1.630
29	1.520	2.310	2.260	1.300		3.480	8.400	12.000	2.740	1.100	1.060	1.520
30	1.550	2.420	2.400	1.440		7.680	8.030	12.700	3.260	1.080	1.080	1.470
31	1.560		2.420	1.590		8.480		13.100		1.020	1.120	



BASIN 15

GREAT BASIN

The Great Basin is the western desert region of the United States. There is no surface outflow from this area to the oceans. All of the streams originate in the surrounding mountains and terminate in closed lakes where equilibrium is maintained between inflow and evaporation.

The Salton Sea lies within the Great Basin. This area was a sink prior to a breakthrough by the Colorado River which flooded the area in 1905–7. It now receives irrigation return flows.

There are two PHS Water Pollution Surveillance System stations in the basin.

The Bear River originates in the Wasatch Mountains of western Wyoming and flows into Idaho before turning south and entering Utah where it discharges into Great Salt Lake near Brigham City, Utah. Precipitation in the Great Salt Lake subbasin varies from 10 to 20 inches per year. Evaporation varies from about 36 to 44 inches per year.

The Truckee River begins at Lake Tahoe on the eastern flank of the Sierra Nevada along the east side of California. This is in a mountainous terrain with an average annual precipitation of about 30 inches in the higher elevations.

Precipitation decreases with altitude and the lower portion of the Truckee drainage basin is arid.

BEAR RIVER ABOVE PRESTON, IDAHO

The Bear River Public Health Service Water Pollution Surveillance station is 9 miles upstream from the Idaho-Utah State line. Samples are collected at U.S. Highway 91 bridge, 3 miles northwest of Preston, Idaho. This stream eventually enters Great Salt Lake near Brigham City, Utah.

Approximately half of the upstream area is irrigated and the other half is dry land farming. Dairying, pasturage, grains, and sugar beets are the major activity. A pollution problem exists on the stream as a result of sugar beet refining wastes and municipal wastes being discharged into the stream. These pollutional sources are being corrected.

The Bear River at Preston, Idaho has exhibited unusual phosphate concentrations, containing 0 ppm from October to December 1962 and increasing gradually to about 0.6 ppm in February and March. These values decreased gradually to a water year end concentration of 0.1 ppm. The source of phosphate is unknown, but is probably agricultural runoff.

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Station Location: Bear River above Preston, Idaho

Major Basin: Great Basin

Minor Basin: Great Salt Lake

Station at: 42°08' Latitude 111°55' Longitude

Miles above mouth: 87

Activation Date: August 20, 1962

Sampled by: Franklin County, Idaho Health Department

Field Analysis by: U.S. Public Health Service

Other Cooperating Agencies: Idaho State Department of Health
Idaho State Highway Department

Hydrologic Data:

Nearest pertinent gaging station: Near Preston, Idaho

Gaging station operated by: U.S. Geological Survey

Drainage area at gaging station: 4,500 square miles

Period of record: 1889-1916, 1943 to present

Average discharge in record period: 795 cfs.

Maximum discharge in record period: 4,420 cfs.

Minimum discharge in record period: 0.6 cfs.

Remarks: Storage reservoirs, powerplants and irrigation demands affect flow.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l
2-25-63	0.05
3- 4-63	0.04
3-11-63	0.04
3-18-63	0.05
3-25-63	0.03
4- 1-63	0.05
4- 8-63	0.04
4-15-63	0.02
5-19-63	0.02
5-27-63	0.03

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	.40	.40
	Na	62	41
	K	9.6	8.2
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	159	19
	Cd	*5	*4
	As	*53	*43
	B	101	97
	P	*13	*22
	Fe	25	10
	Mo	156	*22
	Mn	*3	*2
	Al	—	*23
	Be	*.1	*.1
	Cu	*5	4
	Ag	*1	*1
	Ni	*5	*4
	Co	*11	*4
	Pb	*13	*10
	Cr	*3	*10
	V	*5	*21
	Ba	69	34
	Sr	331	288

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.2	April to June	—	—
January to March	—	—	July to September	3.7	.3

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitctive gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE IDAHO

MAJOR BASIN GREAT BASIN

MINOR BASIN GREAT SALT LAKE

STATION LOCATION BEAR RIVER ABOVE PRESTON, IDAHO

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL		DATE OF DETERMINATION		ALPHA		BETA	
MO	DAY	YR	MO	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO	DAY	pc/g	±	pc/g	±
10	1	62	10	25	0	1	2	3	2	3	3	10	0	10	3	14						
10	8	62	11	1	0	1	4	3	4	3	37	11	26	17	63	20						
10	15	62	11	15	0	1	1	2	1	2	8	11	29	16	37	19						
10	25	62	12	5	1	1	0	9	1	9	13	12	27	16	40	20						
10	29	62	12	15	0	1	0	2	0	2	13	9	19	14	32	17						
11	5	62	12	20	0	1	0	3	0	3	2	5	32	9	34	10						
11	13	62	12	3	0	1	1	3	1	3	11	9	26	14	37	17						
11	19	62	12	4	1	1	6	4	7	4	11	12	15	17	26	21						
11	26	62	12	28	0	1	1	2	1	2	12	11	27	16	39	19						
12	3	62	12	31	0	1	1	2	1	2	7	7	44	10	53	12						
12	15	62	1	9	0	1	1	2	1	2	1	12	44	18	45	22						
12	18	62	1	10	0	2	2	3	2	3	0	43	25	16	25	47						
12	24	62	1	14	1	1	4	3	5	3	1	6	14	9	15	11						
12	31	62	1	15	0	1	0	1	0	1	0	12	21	17	21	21						
1	7	63	1	21	0	1	4	3	4	3	0	6	20	9	20	11						
1	14	63	1	28	0	1	1	2	1	2	3	13	25	16	28	21						
1	21	63	2	14	0	1	3	3	3	3	16	12	39	16	55	20						
1	28	63	2	19	0	1	3	3	3	3	2	11	14	18	16	21						
2	4	63	2	21	1	1	3	5	4	5	48	14	101	22	149	26						
2	11	63	3	1	1	1	0	1	0	1	59	15	106	19	165	24						
2	18	63	3	7	2	1	4	2	6	2	92	14	141	18	233	23						
2	26	63	3	14	1	1	3	2	4	2	0	27	21	14	21	30						
3	4	63	3	28	0	1	2	3	2	3	15	9	89	14	104	17						
3	11	63	4	1	0	1	1	2	1	2	27	6	66	8	93	10						
3	18	63	4	8	0	1	2	2	2	2	12	6	47	8	59	10						
3	25	63	4	10	0	1	3	3	3	3	7	11	61	17	68	20						
4	29	63	6	3*	1	1	1	5	2	5	70	7	147	12	217	14						
5	27	63	6	25*	0	1	0	2	0	2	0	29	24	15	24	33						
6	24	63	8	6*	0	0	2	2	2	2	24	6	80	17	104	18						
7	29	63	9	23*	0	0	1	3	1	3	5	5	50	14	55	15						
8	26	63	10	14*	0	1	2	3	2	3	4	3	33	10	37	10						
9	30	63	11	23*	0	0	1	3	1	3	5	4	44	13	49	14						

PLANKTON POPULATION

STATE IDAHO
MAJOR BASIN GREAT BASIN
MINOR BASIN GREAT SALT LAKE
STATION LOCATION BEAR RIVER ABOVE
PRESTON, IDAHO

DATE OF SAMPLE			ALGAE (Number per milliliter)								INERT DIATOM SHELLS		MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																	
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS			1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILAMENTOUS	COCCOID	FILAMENTOUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	8	62	900	10	0	80	0	30	0	350	370	190	400	69	1																
10	25	62	00	0	0	0	0	0	0	0	10	0	0																		
11	13	62	1700	20	0	50	0	20	20	1350	270	20	70	71	4																
11	26	62	4500	00	40	60	0	0	0	2610	1660	40	80	71	5	82	4	92	1												
12	17	62	3600	0	0	40	0	180	0	2160	1190	40	130	71	4	82	3	92	1	87	1										
12	24	62	3200	0	0	50	0	0	0	2150	980	50	400	71	4	82	3														
1	21	63	500	0	60	0	0	0	0	80	340	20	110	82	1																
2	4	63	600	0	20	0	0	0	40	40	480	0	240	77	2																
2	18	63	300	0	0	0	0	0	40	20	240	0	150																		
3	4	63	200	0	0	20	0	20	40	40	80	0	250																		
3	18	63	600	0	0	0	0	0	0	110	510	20	290	85	2																
4	8	63	10400	0	0	500	0	80	40	340	9410	80	550	87	3	55	2	71	2												
4	23	63	900	0	0	40	0	130	0	180	550	0	290	87	2	71	1														
5	6	63	2300	0	20	20	0	40	1010	90	1080	180	260	65	3	87	3														
5	27	63	1200	0	0	40	0	200	0	680	260	220	310	68	2	71	1	65	1												
6	10	63	1100	0	0	20	0	20	0	370	640	20	400	87	1	68	1	71	1												
6	24	63	1600	0	0	90	0	70	20	110	1310	0	630	87	3																
7	22	63	900	0	0	190	0	0	0	40	660	20	500																		
8	5	63	2400	0	0	100	0	0	300	300	1670	70	1430																		
8	19	63	1600	0	0	90	0	0	0	370	1120	40	330																		
9	2	63	900	20	0	40	0	0	0	110	690	40	670																		
9	16	63	600	0	50	50	0	0	0	110	430	50	520																		

PLANKTON POPULATION

STATE IDAHO

MAJOR BASIN GREAT BASIN

MINOR BASIN GREAT SALT LAKE

STATION LOCATION BEAR RIVER ABOVE PRESTON, IDAHO

125

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES																					
			1ST		2ND		3RD		4TH		OTHER SPECIES PERCENT		PROTOZOA (Identify/table) Number per ml.	ROTIFERS										CRUSTACEA								NEMATODES (Identify/table) Number per liter	OTHER ANIMAL FORMS (Number per liter)
															GENERA AND COUNT LEVEL (See text for Codes)											GENERA AND COUNT LEVEL (See text for Codes)							
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT				NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	NUMBER PER LITER	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	8	62	80	34	36	10	56	9	26	7	40	-	-	0																				
10	25	62																																
11	13	62	80	69	36	15	92	7	56	4	5	-	-	0											0							2	0
11	26	62	36	54	80	34	92	7	65	2	3	60	-	1											0							0	0
12	17	62	36	41	80	37	92	7	65	5	10	110	-	0											1							0	0
12	24	62	80	55	36	31	51	4	92	2	8	-	-	0											0							0	1
1	21	63	35	30	9	21	89	18	80	9	22	20	-	2											0							0	0
2	4	63	80	16	65	14	36	9	64	8	53	-	-	9	11	1									0							0	0
2	18	63	80	11	51	9	65	9	71	7	64	-	-	0											0							0	0
3	4	63	80	21	51	16	65	11	66	9	43	-	-	1											0							0	0
3	18	63	51	40	65	15	80	8	66	7	30	-	-	0											0							0	0
4	8	63	65	83	66	4	51	3	36	2	8	-	-	5											0							0	0
4	23	63	65	56	82	13	80	6	66	3	22	-	-	0											0							0	0
5	6	63	65	45	82	25	66	7	56	5	18	-	-	4											0							0	0
5	27	63	56	63	65	7	58	5	23	4	21	-	-	-											-							1	0
6	10	63	15	17	65	14	26	12	36	9	48	-	-	-											-							-	-
6	24	63	65	37	66	18	26	9	16	7	29	-	-	-											-							-	-
7	22	63												-											-							-	-
8	5	63												-											-							-	-
8	19	63												-											-							-	-
9	2	63												-											-							-	-
9	16	63												-											-							-	-

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ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE IDAHO

MAJOR BASIN GREAT BASIN

MINOR BASIN GREAT SALT LAKE

STATION LOCATION BEAR RIVER ABOVE PRESTON, IDAHO

125

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLORO-FORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGEN-ATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
5	13	63	6	3	5813#	111	49	62	3	12	15	1	1	12	1	10	5	1	3
6	24	63	7	5	5100#	111	50	61	3	15	13	0	2	10	1	6	5	1	7
8	5	63	8	13	5100	131	46	85	1	17	10	1	1	8	0	5	4	1	8
9	3	63	9	10	4940#	107	24	83	1	7	10	1	2	7	0	2	1	1	2

ESTIMATED

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE IDAHO

MAJOR BASIN GREAT BASIN

MINOR BASIN GREAT SALT LAKE

STATION LOCATION BEAR RIVER ABOVE PRESTON, IDAHO

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	1	62	-	-	8.3	-	-	-	-	-	63	320	360	10	*25	85	.0	520	-
10	8	62	-	-	8.0	-	-	-	-	-	64	328	344	5	*25	70	.0	540	-
10	15	62	-	-	8.2	-	-	-	-	-	61	312	320	10	*25	75	.0	551	-
10	25	62	-	-	-	-	-	-	-	-	64	308	344	0	*25	83	.0	523	-
10	29	62	-	-	8.4	-	-	-	-	-	57	320	330	0	*25	75	.0	540	-
11	5	62	-	-	8.1	-	-	-	-	-	48	290	304	0	*25	95	.0	500	-
11	13	62	-	-	8.3	-	-	-	-	-	64	304	320	5	*25	75	.0	524	-
11	19	62	-	-	8.0	-	-	-	-	-	50	286	320	0	*25	60	.0	540	-
11	26	62	-	-	8.5	-	-	-	-	-	62	284	332	0	*25	85	.0	540	-
12	3	62	-	-	8.1	-	-	-	-	-	34	250	-	5	*25	87	.0	439	-
12	15	62	-	-	8.3	-	-	-	-	-	48	284	328	0	*25	80	.1	490	-
12	18	62	-	-	8.4	-	-	-	-	-	48	310	348	0	*25	85	.2	510	-
12	24	62	-	-	8.2	-	-	-	-	-	43	342	460	-	*25	76	.2	520	-
12	31	62	-	-	8.3	-	-	-	-	-	46	340	500	-	*25	70	.3	525	-
1	7	63	-	-	8.3	-	-	-	-	-	47	348	364	-	*25	75	.3	487	-
1	14	63	-	-	8.2	-	-	-	-	-	36	312	320	-	*25	52	.1	450	-
1	21	63	-	-	8.1	-	-	-	-	-	31	316	350	-	*25	55	.1	475	-
1	28	63	-	-	8.1	-	-	-	-	-	46	360	380	-	*25	72	.4	552	-
2	4	63	-	-	8.1	-	-	-	-	-	27	280	360	15	*25	55	.4	440	-
2	11	63	-	-	7.8	-	-	-	-	-	29	332	268	15	*25	62	.1	400	-
2	18	63	-	-	7.8	-	-	-	-	-	32	252	264	15	*25	60	.6	400	-
2	25	63	-	-	7.9	-	-	-	-	-	35	268	288	15	*25	66	.6	430	-
3	4	63	-	-	7.9	-	-	-	-	-	43	280	310	5	*25	66	.6	510	-
3	11	63	-	-	7.9	-	-	-	-	-	37	280	310	10	*25	48	.5	430	-
3	18	63	-	-	7.7	-	-	-	-	-	46	300	310	5	*25	62	.3	470	-
3	25	63	-	-	7.4	-	-	-	-	-	40	300	330	10	*25	62	.4	410	-
4	1	63	-	-	7.0	-	-	-	-	-	46	300	330	5	*25	62	.0	450	-
4	8	63	-	-	8.0	-	-	-	-	-	49	290	320	5	*25	65	.5	470	-
4	15	63	-	-	7.7	-	-	-	-	-	44	290	320	5	*25	62	.3	390	-
4	23	63	-	-	7.5	-	-	-	-	-	46	276	330	5	*25	55	.0	420	-
4	29	63	-	-	-	-	-	-	-	-	44	300	320	10	*25	62	.2	440	-
5	6	63	-	-	-	-	-	-	-	-	38	276	300	5	*25	55	.2	410	-
5	13	63	-	-	-	-	-	-	-	-	34	260	280	5	*25	48	.1	380	-
5	19	63	-	-	-	-	-	-	-	-	34	260	290	5	*25	50	.1	400	-
5	27	63	-	-	-	-	-	-	-	-	24	250	310	15	*25	50	.1	400	-
6	3	63	-	-	-	-	-	-	-	-	65	260	300	5	*25	55	.1	420	-
6	10	63	-	-	-	-	-	-	-	-	58	270	280	15	*25	52	.1	400	-
6	17	63	-	-	-	-	-	-	-	-	44	270	310	5	*25	52	.0	440	-
6	24	63	-	-	-	-	-	-	-	-	48	280	300	10	*25	63	.2	480	-

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE IDAHO
MAJOR BASIN GREAT BASIN
MINOR BASIN GREAT SALT LAKE
STATION LOCATION BEAR RIVER ABOVE PRESTON, IDAHO

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
7	3	63	–	–	–	–	–	–	–	–	46	260	320	10	*25	63	.1	450	–
7	8	63	–	–	–	–	–	–	–	–	48	290	360	10	*25	72	.1	520	–
7	15	63	–	–	–	–	–	–	–	–	58	320	330	15	*25	85	.1	510	–
7	22	63	–	–	–	–	–	–	–	–	55	300	380	5	*25	82	.2	520	–
7	29	63	–	11.9	–	2.2	–	–	–	–	58	300	380	15	*25	82	.1	500	–
8	5	63	–	–	–	–	–	–	–	–	60	300	360	10	*25	85	.1	520	–
8	12	63	24.0	6.0	–	1.7	–	–	–	–	66	328	350	5	*25	88	.1	540	–
8	19	63	–	–	–	–	–	–	–	–	62	332	350	0	*25	88	.2	530	–
8	26	63	–	12.2	–	3.5	–	–	–	–	84	310	350	5	*25	88	.2	510	–
9	3	63	–	–	–	–	–	–	–	–	50	320	340	0	*25	88	.1	500	–
9	10	63	–	–	–	–	–	–	–	–	62	320	360	5	*25	90	.1	530	–
9	16	63	–	–	–	–	–	–	–	–	62	320	360	5	*25	90	.1	550	–
9	30	63	26.0	8.9	–	7.2	–	–	–	–	66	340	380	5	*25	90	.1	550	–

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station near Preston, Idaho
Operated by U.S. Geological Survey

STATE Idaho

MAJOR BASIN Great Basin

MINOR BASIN Great Salt Lake

STATION LOCATION Bear River above Preston, Idaho

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.203	.293	.341	.110	3.380	.568	.480	1.000	.527	.386	.877	.617
2	.303	.440	.191	.512	3.060	.438	.502	.939	.269	.236	.945	.658
3	.275	.478	.411	.459	2.350	.376	.590	.854	.394	.564	.779	.688
4	.263	.125	.532	.566	1.260	.484	1.410	1.050	.640	.581	.662	.730
5	.257	.170	.610	.316	1.040	.295	.277	.765	1.380	.808	.402	.663
6	.311	.384	.554	.155	1.380	.434	.136	.994	.286	.995	.315	.532
7	.308	.380	.377	.441	1.170	.407	.421	.784	.087	1.120	.937	.587
8	.283	.374	.213	.393	.855	.333	.622	.883	.364	1.080	.934	.452
9	.286	.493	.055	.420	.921	.496	.741	.959	.554	1.090	.867	.372
10	.573	.420	.253	.460	.795	.090	1.130	1.180	.492	1.090	.894	.418
11	.729	.208	.472	.417	.746	.338	.749	.816	.748	1.080	.845	.190
12	.086	.213	.489	.144	.397	.601	.871	.875	.761	1.070	.813	.175
13	.038	.331	.509	.073	.659	.512	.512	1.020	.870	1.020	.632	.278
14	.039	.380	.548	.253	.481	.605	.606	1.160	.810	1.030	.786	.305
15	.326	.452	.529	.335	.554	.499	.670	.726	.501	1.020	.805	.179
16	.200	.450	.086	.450	.584	.239	.552	1.170	.441	1.080	.812	.315
17	.288	.468	.156	.406	.363	.238	.780	1.060	.523	.902	.840	.383
18	.201	.063	.453	.469	.413	.510	.794	.600	.829	1.000	.813	.385
19	.301	.295	.492	.331	.739	.413	.702	.169	.756	.846	.720	.315
20	.432	.252	.599	.142	.874	.505	.623	.407	.526	.759	.813	.347
21	.063	.403	.472	.434	.536	.596	.562	.689	.608	.881	.822	.308
22	.312	.428	.511	.346	.844	.442	.863	.642	.656	.818	.844	.255
23	.540	.498	.292	.455	.441	.402	.764	.487	.430	.788	.868	.277
24	.411	.502	.271	.298	.293	.295	.491	.807	.417	.777	.865	.230
25	.044	.292	.111	.464	.409	.332	.602	.217	.639	.860	.604	.357
26	.218	.345	.353	.357	.681	.477	.685	.487	.245	.862	.746	.298
27	.305	.410	.306	.397	.717	.511	.868	.601	.609	.948	.959	.323
28	.075	.447	.463	.343	.710	.634	.727	.497	.633	.964	.853	.277
29	.357	.491	.274	.457		.517	.725	.524	.450	.664	.865	.215
30	.283	.386	.379	.500		.627	1.110	.446	.836	.817	.943	.248
31	.229		.329	.910		.319		.357		.822	.912	

TRUCKEE RIVER, CALIFORNIA-NEVADA BORDER AT FARAD, CALIFORNIA

This Water Pollution Surveillance System station is located 21 miles below Lake Tahoe and above the point where the Truckee River enters Nevada. Samples are collected at the Farad power plant of the Sierra Pacific Electric Company. The primary upstream uses of water are domestic water supply, recreation, and hydroelectric power generation at Lake Tahoe. Downstream, the river supplies municipal water to Reno and Sparks, Nevada and irrigation water to the surrounding area before terminating in Pyramid Lake.

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Station Location:	Truckee River, California - Nevada Border at Farad, California
Major Basin:	Great Basin
Minor Basin:	Northwestern Lahontan
Station at:	39°28' Latitude 120°01' Longitude
Miles above mouth:	82
Activation Date:	September 29, 1961
Sampled by:	California Department of Water Resources Nevada County, California, Health Dept.
Field Analysis by:	California Department of Water Resources
Other Cooperating Agencies:	Sierra Pacific Electric Company California Department of Public Health
Hydrologic Data:	
Nearest pertinent gaging station:	At Farad, California
Gaging station operated by:	U.S. Geological Survey
Drainage area at gaging station:	932 square miles
Period of record:	1899 to present
Average discharge in record period:	781 cfs.

Maximum discharge in record period: 17,500 cfs.

Minimum discharge in record period: 28 cfs.

Remarks: Flow regulated by Lakes Tahoe, Donner and Independence. Flow affected by power plant operation.

ALKYL BENZENE SULFONATE (ABS)

Date	mg/l

ELEMENTAL ANALYSES

		Composite Interval 10/1/62 to 12/31/62	Composite Interval 4/1/63 to 6/30/63
Analysis by wet or flame methods. Results in mg/l	F	*.01	.15
	Na	5.0	42
	K	2.1	1.0
Analysis by Spectrographic methods. Results in micrograms per liter	Zn	44	48
	Cd	1	*1
	As	20	*10
	B	44	17
	P	24	8
	Fe	19	6
	Mo	3	*2
	Mn	.4	*.6
	Al	—	27
	Be	*.02	*.02
	Cu	22	24
	Ag	*.2	*.2
	Ni	*1	7
	Co	*2	*1
	Pb	2	2
	Cr	*1	*2
	V	*1	*3
	Ba	29	17
	Sr	100	51

*Actual value is less than the amount shown. Reported result indicates limit of sensitivity at which test was performed. See text for explanation.

STRONTIUM 90 ACTIVITY

Composite Interval	pc/l	±	Composite Interval	pc/l	±
October to December	.9	.3	April to June	1.0	.2
January to March	—	—	July to September	—	—

± at 95% Confidence Limits

SPECIFIC QUALITATIVE IDENTIFICATIONS FROM CARBON ADSORPTION EXTRACTS WATER YEAR 1962-3

Interval	Compound	Concentration* ug/l

*Concentration values, where shown, are calculated from quantitative gas chromatographic analysis of the aromatic fractions of CCE, and may be assigned the units of ug/l. In light of the unknown efficiency of carbon adsorption sampling for these compounds, the reported values represent minima, the actual values being equal to or greater than the reported values.
See page 21.

RADIOACTIVITY DETERMINATIONS

STATE CALIFORNIA-NEVADA

MAJOR BASIN GREAT BASIN

MINOR BASIN NORTHWESTERN LAHONTAN

STATION LOCATION TRUCKEE RIVER, CAL-NEV BORDER AT FARAD, CALIFORNIA

88

DATE SAMPLE TAKEN			RADIOACTIVITY IN WATER												RADIOACTIVITY IN PLANKTON					
			DATE OF DETERMINATION		ALPHA						BETA						DATE OF DETERMINATION		GROSS ACTIVITY			
					SUSPENDED		DISSOLVED		TOTAL		SUSPENDED		DISSOLVED		TOTAL				ALPHA		BETA	
MO.	DAY	YR.	MO.	DAY	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	pc/l	±	MO.	DAY	pc/g	±	pc/g	±
10	8	62	12	19	4	5	0	1	4	5	30	38	6	7	36	39						
10	15	62	12	17	–	–	–	–	–	–	6	11	19	12	25	16						
10	22	62	12	5	–	–	–	–	–	–	2	4	8	5	10	7						
10	29	62	12	24	–	–	–	–	–	–	3	4	7	4	10	6						
11	26	62	12	20*	–	–	–	–	–	–	5	6	11	6	16	8						
12	17	62	1	23*	1	1	1	1	2	1	4	6	12	6	16	8						
1	23	63	2	26*	0	1	0	1	0	1	0	7	5	6	5	9						
2	27	63	3	20*	0	0	0	0	0	0	4	6	6	5	10	8						
3	10	63	4	22	1	1	0	0	1	1	4	3	42	4	46	5						
4	8	63	5	31*	0	1	0	1	0	1	9	4	20	4	29	6						
5	14	63	6	21*	0	0	0	0	0	0	14	4	14	4	28	6						
6	10	63	7	30*	0	1	0	1	0	1	48	7	19	6	67	9						
7	15	63	9	9*	0	1	0	0	0	1	1	3	8	3	9	4						
8	14	63	10	8*	0	0	0	0	0	0	5	5	13	7	18	9						
9	30	63	11	6*	0	1	0	1	0	1	4	6	14	6	18	8						

PLANKTON POPULATION

STATE CALIFORNIA-NEVADA

MAJOR BASIN GREAT BASIN

MINOR BASIN NORTHWESTERN LAHONTAN

STATION LOCATION TRUCKEE RIVER, CAL-NEV BORDER AT FARAD, CALIFORNIA

88

DATE OF SAMPLE			ALGAE (Number per milliliter)										MOST ABUNDANT ALGAE - Genera and Count Level per ml. (See text for Codes)																			
			TOTAL	BLUE-GREEN		GREEN		FLAGELLATED (Pigmented)		DIATOMS		INERT DIATOM SHELLS		1ST		2ND		3RD		4TH		5TH		6TH		7TH		8TH		9TH		10TH	
MONTH	DAY	YEAR		COCCOID	FILA-MENT-OUS	COCCOID	FILA-MENT-OUS	GREEN	OTHER	CENTRIC	PENNATE	CENTRIC	PENNATE	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL
10	15	62	200	30	0	0	0	0	0	60	110	70	450																			
11	6	62	400	0	0	20	0	0	0	120	210	40	120																			
11	19	62	700	0	0	0	0	210	0	60	410	20	0	51	1																	
12	4	62	200	0	0	20	0	0	0	70	150	50	320																			
12	17	62	400	0	0	0	0	0	0	30	360	20	200																			
1	7	63	200	0	0	0	0	0	0	50	180	0	180																			
1	30	63	1400	0	0	0	0	0	0	180	1190	220	1650	92	1	88	1															
2	8	63	00	0	0	0	0	0	0	20	0	20	30																			
2	13	63	00	0	0	0	0	0	0	0	0	0	0																			
2	27	63	00	0	0	0	0	0	0	0	20	40	40																			
4	1	63	400	0	0	0	0	0	0	40	400	20	290	97	1																	
4	8	63	1700	0	0	0	0	70	0	150	1450	0	620	97	3	81	1															
5	6	63	500	0	0	20	20	0	0	170	340	20	60																			
5	20	63	200	0	0	0	0	0	0	40	160	20	110																			
6	3	63	200	0	0	0	0	20	0	110	110	70	130																			
6	14	63	200	0	0	0	0	10	0	40	140	10	70																			
8	4	63	300	0	0	20	0	0	110	0	140	20	0																			
8	14	63	700	0	0	80	0	0	0	50	590	690	860	84	2																	
9	2	63	400	140	0	50	0	0	20	50	110	70	250																			
9	12	63	300	210	0	0	0	0	0	20	50	20	100	3	1																	

PLANKTON POPULATION

STATE CALIFORNIA-NEVADA

MAJOR BASIN GREAT BASIN

MINOR BASIN NORTHWESTERN LAHONTAN

STATION LOCATION TRUCKEE RIVER, CAL-NEV BORDER AT FARAD, CALIFORNIA 088

DATE OF SAMPLE			DOMINANT SPECIES OF DIATOMS AND PERCENT OF TOTAL DIATOMS (See text for Codes)									FUNGI AND SHEATHED BACTERIA (Number per ml.)	MICROINVERTEBRATES																			
			1ST		2ND		3RD		4TH				PROTOZOA (Identifiable) (Number per ml.)	ROTIFERS										CRUSTACEA							NEMATODES (Identifiable) (Number per liter)	OTHER ANIMAL FORMS (Number per liter)
														NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)										NUMBER PER LITER	GENERA AND COUNT LEVEL (See text for Codes)							
															1ST		2ND		3RD		4TH		5TH			1ST		2ND		3RD			
MONTH	DAY	YEAR	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	SPECIES	PERCENT	OTHER SPECIES PERCENT				GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		GENUS	COUNT LEVEL	GENUS	COUNT LEVEL	GENUS	COUNT LEVEL		
10	15	62	46	8	16	8	92	6	31	6	72	-	-	0											0							0	0
11	6	62	58	12	92	8	46	8	2	8	64	-	-	2											0							0	0
11	19	62	58	53	9	13	31	5	71	5	24	20	0	55	11	4	21	1							0							0	0
12	4	62	92	13	58	9	36	9	97	7	62	-	-	2											0							0	0
12	17	62	92	10	31	9	2	7	32	6	68	-	-	0											0							0	0
1	7	63	31	15	47	13	71	11	2	8	53	-	-	3											1							0	0
1	30	63	30	24	58	11	97	8	92	8	49	-	-	-											-							-	-
2	8	63										-	-	1											1							0	0
2	13	63										-	-	0											0							0	0
2	27	63										-	-	0											0							0	0
4	1	63	14	34	92	12	31	9	70	9	36	-	-	0											0							0	0
4	8	63	14	65	31	15	92	6	36	2	12	-	-	1											0							0	0
5	6	63	61	35	65	8	52	7	47	6	44	-	-	-											-							-	-
5	20	63	97	34	92	16	47	15	56	12	23	-	-	-											-							-	-
6	3	63	27	26	31	12	9	8	92	7	47	-	-	-											-							-	-
6	14	63	82	35	9	16	55	11	58	11	27	-	-	-											-							-	-
8	4	63										-	-	-											-							-	-
8	14	63										-	-	-											-							-	-
9	2	63										-	-	-											-							-	-
9	12	63										-	-	-											-							-	-

ORGANIC CHEMICALS

RECOVERED BY CARBON FILTER TECHNIQUE

RESULTS IN MICROGRAMS PER LITER
(Parts per billion)

STATE CALIFORNIA-NEVADA

MAJOR BASIN GREAT BASIN

MINOR BASIN NORTHWESTERN LAHONTAN

STATION LOCATION TRUCKEE RIVER, CAL-NEV BORDER AT FARAD, CALIFORNIA

DATE OF SAMPLE BEGINNING MONTH	DAY	YEAR	END MONTH	DAY	GALLONS FILTERED	EXTRACTABLES TOTAL	CHLOROFORM	ALCOHOL	CHLOROFORM EXTRACTABLES ETHER INSOLUBLES	WATER SOLUBLES	NEUTRALS TOTAL	ALIPHATICS	AROMATICS	OXYGENATED COMPOUNDS	LOSS	WEAK ACIDS	STRONG ACIDS	BASES	LOSS
1	9	63	1	30	241*	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	26	63	3	10	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	11	63	3	20	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	1	63	4	8	4044	100	47	53	1	14	14	2	1	9	2	5	2	1	10
5	6	63	5	21	1281	250	105	145	6	31	23	2	2	18	1	13	8	1	23
5	27	63	6	14	2530	136	48	88	1	14	18	3	2	12	1	6	2	1	6
7	1	63	7	15	4400	113	68	45	3	21	12	0	1	10	1	8	8	1	15
8	2	63	8	14	6480	86	46	40	2	13	11	0	1	9	1	5	5	1	9
8	30	63	9	6	4960	96	38	58	1	12	13	1	2	10	0	5	4	1	2

* LOW FLOW

* FLOW UNKNOWN

CHEMICAL, PHYSICAL AND BACTERIOLOGICAL ANALYSES

STATE CALIFORNIA-NEVADA

MAJOR BASIN GREAT BASIN

MINOR BASIN NORTHWESTERN LAHONTAN

STATION LOCATION TRUCKEE RIVER, CAL-NEV BORDER AT FARAD, CALIFORNIA 88

DATE OF SAMPLE			TEMP. (Degrees Centigrade)	DISSOLVED OXYGEN mg/l	pH	B.O.D. mg/l	C.O.D. mg/l	CHLORINE DEMAND		AMMONIA-NITROGEN mg/l	CHLORIDES mg/l	ALKALINITY mg/l	HARDNESS mg/l	COLOR (scale units)	TURBIDITY (scale units)	SULFATES mg/l	PHOSPHATES mg/l	TOTAL DISSOLVED SOLIDS mg/l	COLIFORMS per 100 ml.
MONTH	DAY	YEAR						1-HOUR mg/l	24-HOUR mg/l										
10	5	62	10.0	9.1	7.5	-	-	-	-	.1	2	38	31	0	4	2	.0	69	280
10	8	62	11.7	8.8	7.8	1.2	-	-	-	-	3	44	44	5	*25	4	.0	56	-
10	15	62	-	-	7.3	-	-	-	-	-	4	24	24	20	*25	4	.0	105	-
10	23	62	-	-	7.8	-	-	-	-	-	10	36	40	10	*25	13	.0	80	-
10	29	62	-	-	7.6	-	-	-	-	-	5	42	60	0	*25	6	.0	83	-
11	6	62	-	-	7.9	-	-	-	-	-	57	32	44	5	*25	10	.0	145	800
11	19	62	-	-	7.7	-	-	-	-	-	4	40	28	5	*25	4	.0	52	-
11	26	62	-	-	7.6	-	-	-	-	-	42	36	76	5	*25	14	.0	135	-
12	4	62	2.2	11.3	7.5	-	-	-	-	-	3	32	36	5	*25	4	.0	65	-
12	11	62	-	-	7.7	-	-	-	-	-	6	36	48	5	*25	2	.0	82	-
12	14	62	5.0	10.9	7.3	-	-	-	-	-	2	35	30	10	2	1	.0	79	68
12	17	62	-	-	8.2	-	-	-	-	-	14	32	60	10	*25	7	.0	77	-
1	3	63	1.2	11.7	7.6	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-
1	7	63	-	-	7.5	-	-	-	-	-	4	40	70	-	*25	3	.0	63	-
1	11	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	760
1	16	63	-	-	7.8	-	-	-	-	-	6	50	56	-	*25	7	.0	90	-
1	23	63	-	-	7.7	-	-	-	-	-	6	52	108	-	*25	5	.0	80	-
2	11	63	-	-	7.5	-	-	-	-	-	4	28	28	0	*25	2	.0	110	-
2	15	63	2.8	11.5	7.3	-	-	-	-	.1	3	38	35	20	6	3	.1	79	1000
2	27	63	-	-	7.6	-	-	-	-	-	3	28	32	0	*25	2	.0	40	-
3	8	63	3.9	10.9	7.3	-	-	-	-	.2	3	39	37	20	8	4	.0	73	310
3	10	63	-	-	7.8	-	-	-	-	-	3	42	44	5	*25	3	.0	79	-
3	20	63	4.2	11.0	7.6	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-
4	1	63	-	-	7.5	-	-	-	-	-	4	36	36	0	*25	4	.0	68	-
4	4	63	6.1	10.6	7.7	1.5	-	-	-	-	4	36	33	-	-	3	-	69	180
4	8	63	-	-	8.3	-	-	-	-	-	4	36	40	5	*25	3	.0	85	-
5	3	63	6.1	10.3	7.3	-	-	-	-	.0	1	33	28	20	9	2	.0	62	500
6	7	63	8.9	9.8	7.1	-	-	-	-	.0	1	30	28	20	5	-	.1	54	480
7	3	63	11.5	8.9	-	2.1	-	-	-	-	-	-	-	-	-	-	-	-	-
7	12	63	12.2	9.0	7.2	-	-	-	-	-	3	35	32	-	2	-	-	-	200
8	9	63	14.4	8.4	7.5	-	-	-	-	.0	1	35	30	10	1	2	.1	65	*10
9	13	63	13.3	8.2	7.3	-	-	-	-	.0	2	40	32	25	5	1	.1	60	580

STREAM FLOW DATA - 1962-1963

Thousand Cubic Feet per Second

PROVISIONAL--SUBJECT TO REVISION

Gaging Station at Farad, California
Operated by U.S. Geological Survey

STATE California-Nevada

MAJOR BASIN Great Basin

MINOR BASIN Northwestern Lahontan

STATION LOCATION Truckee Riv., Calif.-Nev. Border at Farad, California

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	.414	.640	.400	.418	7.960	.640	.459	1.310	1.970	.588	.538	.524
2	.396	.655	.418	.410	4.560	.524	.451	1.410	1.830	.578	.534	.524
3	.393	.670	.740	.418	3.530	.516	.471	1.550	1.680	.565	.534	.516
4	.396	.610	.601	.418	3.230	.484	.502	1.610	1.420	.556	.542	.506
5	.386	.574	.520	.404	3.790	.435	.520	1.780	1.380	.538	.538	.506
6	.379	.547	.493	.382	3.790	.368	.826	1.980	1.390	.534	.542	.502
7	.368	.520	.475	.380	2.980	.306	1.310	2.030	1.190	.529	.538	.480
8	.378	.520	.463	.380	2.200	.294	1.350	2.190	1.110	.520	.556	.488
9	.382	.488	.451	.285	1.920	.276	1.160	1.940	1.150	.524	.578	.484
10	.404	.588	.443	.264	1.860	.270	1.010	1.670	1.380	.516	.578	.484
11	.484	.520	.432	.234	1.620	.262	.920	1.500	1.240	.493	.574	.484
12	1.140	.488	.428	.215	.506	.264	.876	1.340	1.160	.498	.570	.488
13	2.540	.467	.424	.210	.493	.262	.909	1.250	1.160	.516	.574	.506
14	2.100	.463	.424	.207	.447	.259	1.100	1.180	1.210	.502	.570	.484
15	1.080	.459	.525	.205	.904	.253	1.140	1.170	1.510	.484	.574	.484
16	.745	.443	.861	.212	1.400	.282	.992	1.310	1.430	.488	.578	.488
17	.780	.435	.480	.210	1.290	.276	.904	1.460	1.450	.498	.578	.498
18	.455	.428	.396	.226	.912	.273	.870	1.670	1.360	.506	.552	.498
19	.578	.421	.376	.210	.428	.279	.887	1.850	1.290	.506	.529	.488
20	.615	.414	.386	.202	.334	.312	.816	2.130	1.200	.498	.524	.484
21	.635	.418	.400	.190	.324	.330	.765	2.400	1.090	.506	.524	.475
22	.625	.410	.404	.199	.368	.318	.730	2.610	.980	.502	.520	.471
23	.606	.404	.407	.199	.459	.306	.821	2.690	.914	.502	.520	.471
24	.610	.396	.407	.194	.455	.291	.892	2.540	.860	.511	.520	.475
25	.655	.396	.404	.199	.560	.303	.904	2.420	.805	.516	.524	.480
26	.740	.396	.455	.207	.640	.306	.810	2.310	.790	.506	.524	.484
27	.735	.435	.592	.199	.705	.371	.775	2.110	.765	.498	.534	.498
28	.666	.421	.547	.197	.770	.455	.865	2.340	.705	.488	.534	.471
29	.442	.400	.451	.202		.447	.986	2.630	.670	.506	.534	.467
30	.705	.382	.447	.696		.459	1.140	2.960	.640	.524	.534	.451
31	.700		.439	.300		.432		2.210		.529	.538	

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